



The Daniel Academy

Permaculture and Property Proposal

Prepared for: The Daniel Academy K-12 School Board

Prepared by: Kris Edler | Permaculture Kansas City

May 21, 2015

EXECUTIVE SUMMARY

About The Daniel Academy

“The Daniel Academy (TDA) is a private Christian school in Kansas City, Missouri for students ranging from preschool through high school. At TDA, our vision is to train our students like modern-day versions of Daniel in the Old Testament, helping them become young men and women prepared with both spiritual and academic excellence, ready to bring the Lord’s presence and use their gifts to serve others wherever they go.

We do this through creating a fun atmosphere where deep friendships can emerge, while also focusing on high-quality classroom education with student-led worship assemblies, Bible classes, and three-times-a-day prayer” (www.thedanielacademy.com).

This unique school atmosphere uses a family partnership model, which they have pioneered in the midwestern United States. Students attend four school days per week and take one day for homeschooling and to go deeper into projects. Families are also required to partner with their students education by serving at the school. Involvement may range from grading paper, helping in the classroom, all the way to cleaning up in the lunchroom.

This involvement of the family and restructuring of the educational model has been in practice for 8 years and already students (grades 3-12) are above the national average at nearly every grade level. Multiple grade levels are achieving scores in the top 15th percentile in Stanford Achievement Testing results.

Project Objective

The purpose of this TDA initiative is to incorporate permaculture and other sustainable practices into the DNA of the school in order to encourage global awareness, sustainable land use and practice, and to enhance the overall classroom experience with permaculture teaching from students in kindergarten through 12th grade. By training our students in permaculture, the hope

COMPANY NAME

is to encourage proper land management on the school property, but to also have a ripple effect throughout the school community at large.

Goals

On a broad scale, the goal is to enhance education in the private sector using outdoor learning experiences that will enable students to reach their highest potential academically, personally, and spiritually. For this particular initiative, the goal is transform the 18 acre school property into a certified wildlife habitat, while also incorporating permaculture practices across the board. At the same time, the school recognizes that permaculture itself does not incorporate “spirituality” into its core beliefs, however the notion of earth care, people care, fair share are maxims which TDA can walk out in their own unique way.

THE PROJECT GOALS ARE:

1. To create an outdoor learning environment for Kindergarten through 12th grade where students can have hands on experiences to enhance classroom objectives.
 2. To create and maintain a sustainable, environmentally friendly, and productive school property.
 3. To not only save money on conventional (grass and bush) landscaping, but to also become a site that produces food and income to give back to the local community.
 4. To be a certified Wildlife Habitat through the National Wildlife Foundation and to train students from a young age to value and enhance the environment which they live.
 5. To teach students to give back to their community, foster healthy work habits, teach life-long outdoor skills, and create enjoyable learning experiences.
 6. To create private school (K-12) curriculum that can be internally used, but also provide other private schools in the midwest with the ability to duplicate the process on their own properties.
 7. To eventually host permaculture design certification courses as extra-curricular options through the school OR to use this course as a private school practical arts credit.
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Timeframe

This project proposal contains both short (1-year) and long-term (20+ year) goals and benchmarks. These projects may be re-arranged within the same time period categories, but should generally follow the recommended protocol. Following this structure will allow for structural building development and the natural evolution of the land use to work in synergy with each other.

Project Outline

Incorporating permaculture (permanent agriculture) into a school system as a multi-layered benefit that does not merely stop with a few native plantings on the property. These practices are able to be incorporated in every classroom, teacher training, and work environment that the school creates. For the purpose of this particular project, this document will primarily focus on land and structural use around the building. It will include the following:

- A climate description and summary
 - Site description and history
 - Site Analysis
 - Vegetation analysis and projectery
 - Design plan (1 year, 3 year, 5 year, 10 year, 20+)
 - Sector and property zoning
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SITE INFORMATION

LOCATION

310 W 106th Street
Kansas City, MO 64137 USA

LATITUDE, LONGITUDE

(38.937030, -94.59474)

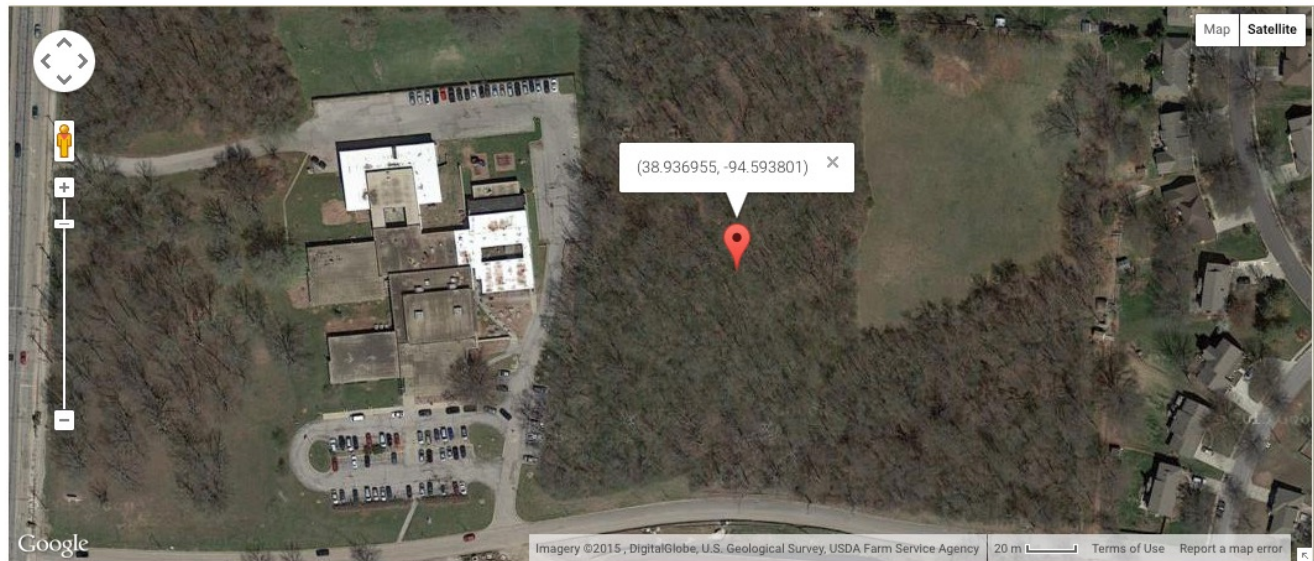
ELEVATION

896 feet above sea level

GPS COORDINATES

38° 56' 13.3080" N

94° 35' 41.0640" W



KANSAS CITY GIS KIVA PIN

153830 34 - Permits (see page)

COUNTY ASSESSOR PARCEL NUMBER

JA48830041500000000

OWNER

THE DANIEL ACADEMY

PATROL DIVISION

South

NOTE: The S Kansas City police do regular rounds on our property and in the surrounding area because there are two private schools in close proximity to one another. Due to neighbor feedback prior to The Daniel Academy occupancy, police are more alerted to property violations in the area.

CENSUS NEIGHBORHOOD

Bridlespur

NOTE: The site was previously owned by tenants who were less than satisfactory on their property upkeep. Many areas of the property had fallen into disrepair, so upon TDA occupancy, they have faced numerous complaints filed by the neighborhood association. Since occupancy, The Daniel Academy has delivered two newsletters for neighbors to update them on the transition of ownership. Though the property complaints have significantly lessened, there are still occasional neighborhood complaints being filed as the clean-up continues. However, there has been substantial progress made in a very short amount of time. City officials have said, "You have accomplished more on this property in 2 years than in the last 25 years combined!" Going forward, The Daniel Academy plans to continue distributing newsletters to the local Bridlespur neighborhood to inform them of development and progress.

SCHOOL DISTRICT

CENTER 120

PARK REGION

South

PUBLIC WORKS MAINTENANCE DISTRICT

D3

IMPACT FEE ZONE

G

ECONOMIC DEVELOPMENT (EDC) TERRITORY

South

LEGAL ZONING

R-7.5

Kansas City's residential (R) zoning districts are primarily intended to create, maintain and promote a variety of housing opportunities for individual households and to maintain the desired physical character of existing and developing neighborhoods. While the districts primarily accommodate residential use types, some nonresidential uses are also allowed. The R district standards provide development flexibility, while at the same time helping to ensure that new development is compatible with the city's many neighborhoods. In addition, the regulations offer certainty for property owners, developers, and neighbors about the limits of what is allowed (<http://online.encodeplus.com/regs/kansascity-mo/doc-view.aspx?h=1&pdf=1&mode=4&district=R-7.5>)

LAND USE

4110 - School

EXISTING CITY PERMITS FOR THE SITE

APN: JA48830041500000000 Alt. APN: 459249100101

CPEP 9411588

ELECTRICAL GENERAL PERMIT

15-Feb-1994

GFI1 4040

FIRE INSPECTION

30-Jul-1999

CPMP 9411881

MECHANICAL GENERAL PERMIT

22-Feb-1994

WS09 1074

WATER MAIN REPLACEMENT PERMIT

04-Nov-2014

CPEP 9412207

ELECTRICAL GENERAL PERMIT

CPBP 9521857

SITE IMP-PARKING LOT/GRADING/
EXCAVATION

06-Sep-1995

CPMR 9412440

MECHANICAL REFRIGERATION PERMIT

07-Mar-1994

SEEC 70204270

EXCAVATION - COMMUNICATION

10-Feb-2015

CPBF 9412496

COMMERCIAL TENANT FINISH/REMODEL
PERMIT

08-Mar-1994

SEEC 70206565

EXCAVATION - COMMUNICATION

14-May-2015

CPEP 9412510

ELECTRICAL GENERAL PERMIT

09-Mar-1994

CRBL 940065

NEW/ADDN COMMRCIAL BUILDING
PLANS REVIEW

CPEP 9414096

ELECTRICAL GENERAL PERMIT

12-Apr-1994

CRBL 940155

NEW/ADDN COMMERCIAL BUILDING
PLANS REVIEW
22-Feb-1994

CPEP 9808203

ELECTRICAL GENERAL PERMIT
15-Sep-1997

CRTF 200111549

COMMRCIAL TENANT FINSH/REMDL
PLANS REVW
12-Apr-2001

CPBF 200128326

COMMERCIAL TENANT FINISH/REMODEL
PERMIT
12-Apr-2001

CPEP 200129269

ELECTRICAL GENERAL PERMIT
30-Apr-2001

CPBE 9015251

BOILER PERMIT
21-May-1990

CPMP 200211351

MECHANICAL GENERAL PERMIT
25-May-2001

CPBP 9222439

SITE IMP-PARKING LOT/GRADING/
EXCAVATION
12-Nov-1992

CPBF 9223162

COMMERCIAL TENANT FINISH/REMODEL
PERMIT
07-Dec-1992

CPPL 9223193

PLUMBING GENERAL PERMIT
07-Dec-1992

CPEP 9223247

ELECTRICAL GENERAL PERMIT
310 W 106TH ST PH-2

CPBP 9223308

SITE IMP-PARKING LOT/GRADING/
EXCAVATION
09-Dec-1992

CPEP 9223319

ELECTRICAL GENERAL PERMIT
09-Dec-1992

CPMP 9223366

MECHANICAL GENERAL PERMIT

11-Dec-1992

SEEC 70191784

EXCAVATION - COMMUNICATION

06-Nov-2013

CPSB 9312301

ON-PREMISES BUSINESS ADV SIGN
PERMIT

18-Mar-1993

SEEC 70192172

EXCAVATION - COMMUNICATION

20-Nov-2013

CLIMATE & SITE DESCRIPTION

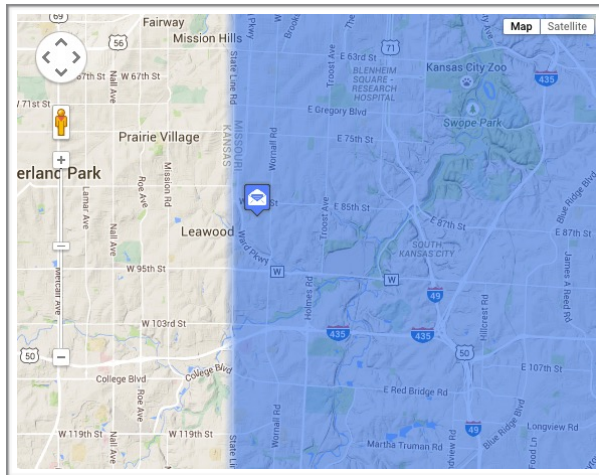
PLANTING ZONE | COLD RANGE

Zone 5b (-15° F thru -10° F)

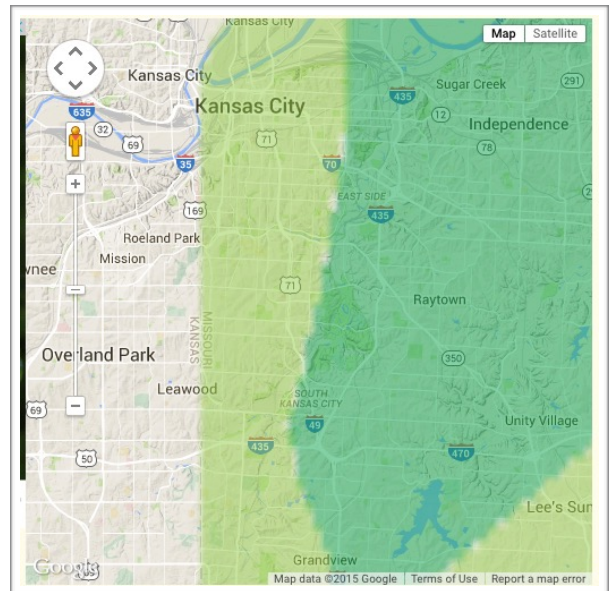
NOTE: There are small pockets of 5a in our region as well, depending on microclimate.

PLANTING ZONE | HEAT RANGE

Zone 7 (61-90 days > 86° F)



Cold Hardiness Map

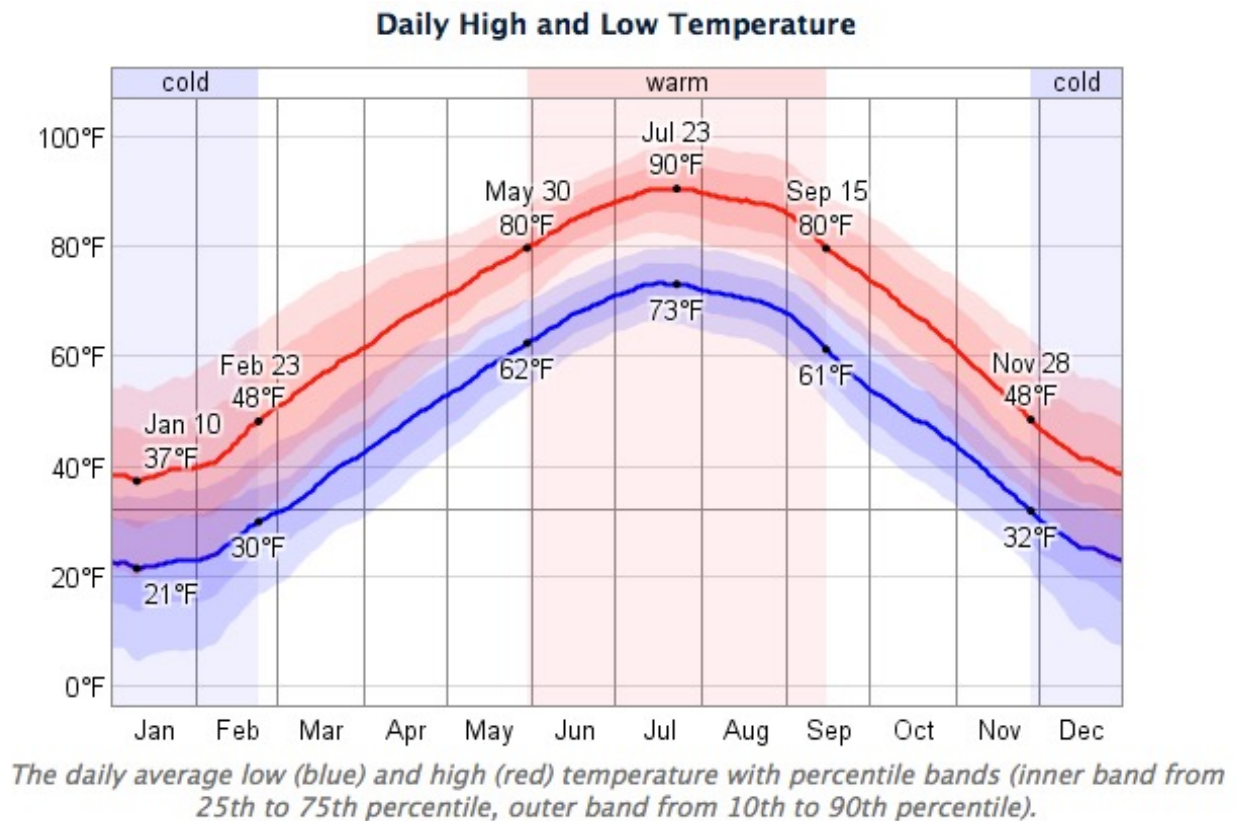


Heat Hardiness Map

AVERAGE DAILY TEMPERATURE | HIGHS AND LOWS

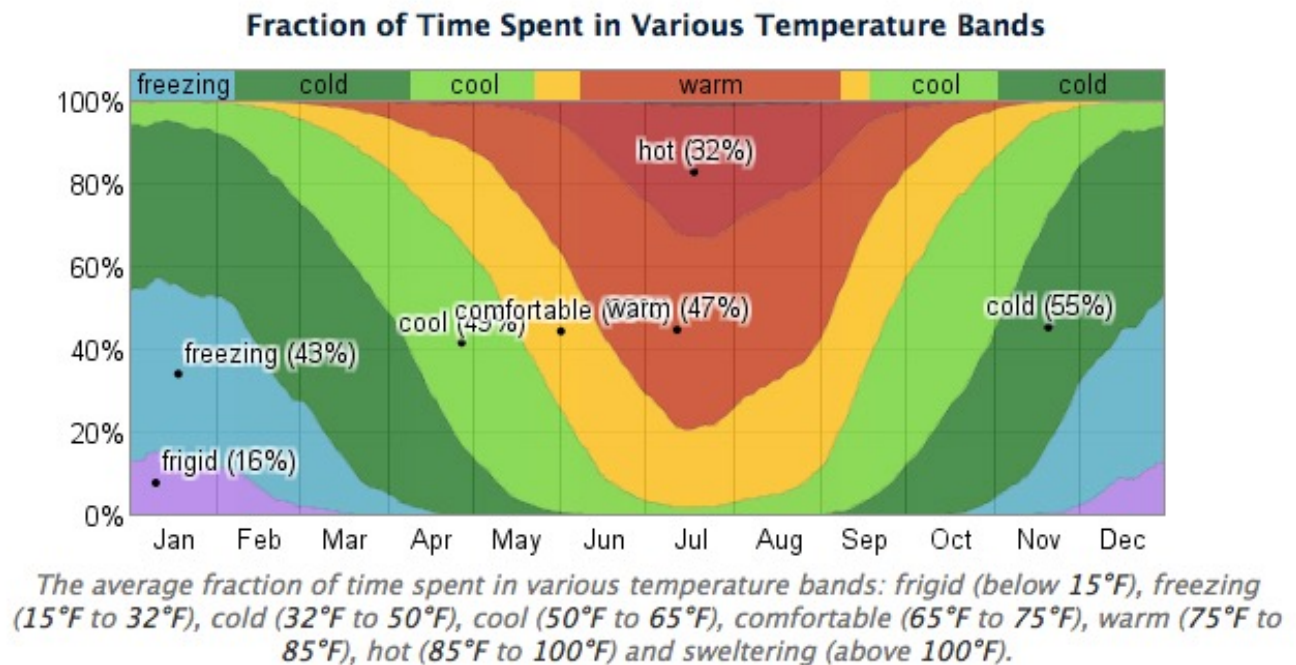
Over the course of an average year, the temperature range will vary from 21° to 90° F, but will rarely go below 5° F or above 99° F. The warm season lasts from May 30 to around mid-September, with the hottest day of the year being July 23. The average temperature on this date has a high of 90° F and a low of 73° F.

The cold season is from the end of November to February 28, with an average daily high of 48° F. The coldest day of the year is January 10, with an average of 21° F.



(www.weatherspark.com)

TIME SPENT IN VARIOUS TEMPERATURE RANGES



NOTE: During the hotter years, the site can produce month long periods of over 100° F and very little water. This causes a deep fluxuation in the average rainfall. Recent drought years in the midwestern United States (2012-2014) have caused an increased need for water retention and capturing strategies. As noted in the later section on soil type, this site has a primarily clay based soil, which tends to dry and harden quickly if uncovered during the drought seasons.

KANSAS CITY WEATHER AVERAGES

www.usclimatedata.com

Annual High Temperature: 66° F

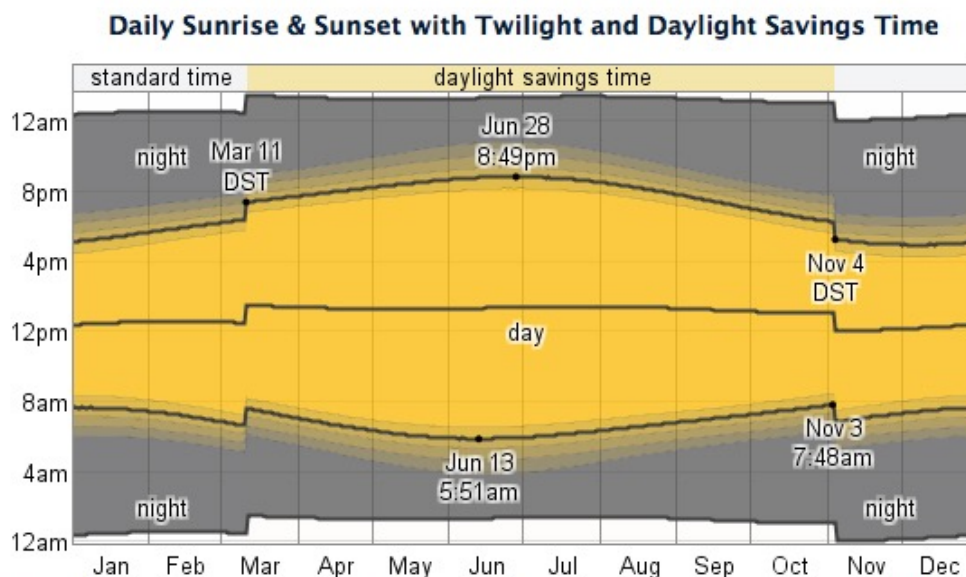
Annual Low Temperature: 47.4° F

Average Temperature: 56.7° F

AVERAGE DAY LENGTH, SUNRISE, AND SUNSET

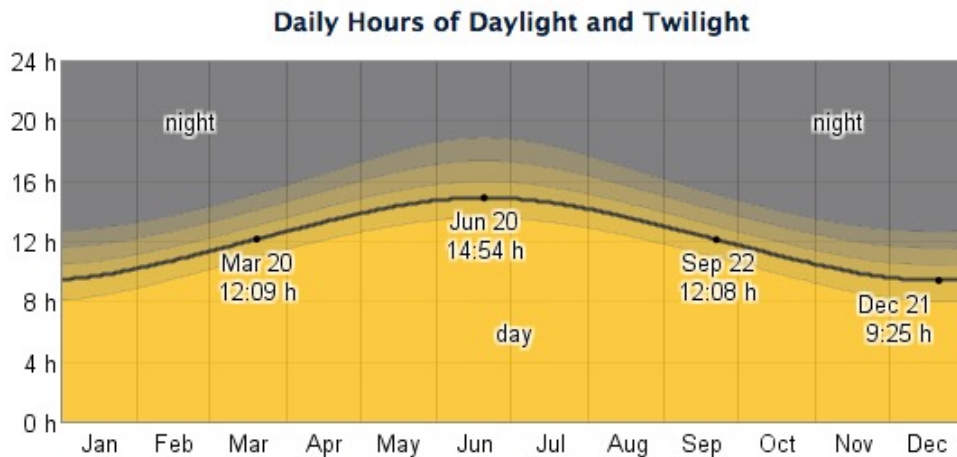
As noted by weatherspark.com, "The length of the day varies significantly over the course of the year. The shortest day is December 21 with 9:26 hours of daylight; the longest day is June 20 with 14.55 hours of daylight.

The earliest sunrise is 5:51am on June 13 and the latest sunset is 8:49pm on June 28. The latest sunrise is at 7:48am on November 3 and the earliest sunset is at 4:55pm on December 9.



The solar day over the course of the year 2012 . From bottom to top, the black lines are the previous solar midnight, sunrise, solar noon, sunset, and the next solar midnight. The day, twilights (solar, civil, nautical, and astronomical), and night are indicated by the color bands from yellow to gray. The transitions to and from daylight savings time are indicated by the "DST" labels.

DAILY HOURS OF SUN



The number of hours during which the Sun is visible (black line), with various degrees of daylight, twilight, and night, indicated by the color bands. From bottom (most yellow) to top (most gray): full daylight, solar twilight (Sun is visible but less than 6° from the horizon), civil twilight (Sun is not visible but is less than 6° below the horizon), nautical twilight (Sun is between 6° and 12° below the horizon), astronomical twilight (Sun is between 12° and 18° below the horizon), and full night.

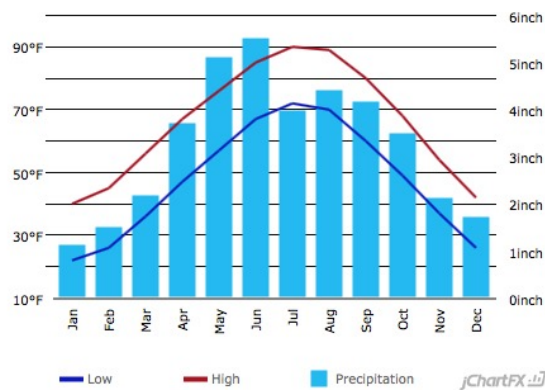
www.weatherspark.com

AVERAGE PRECIPITATION

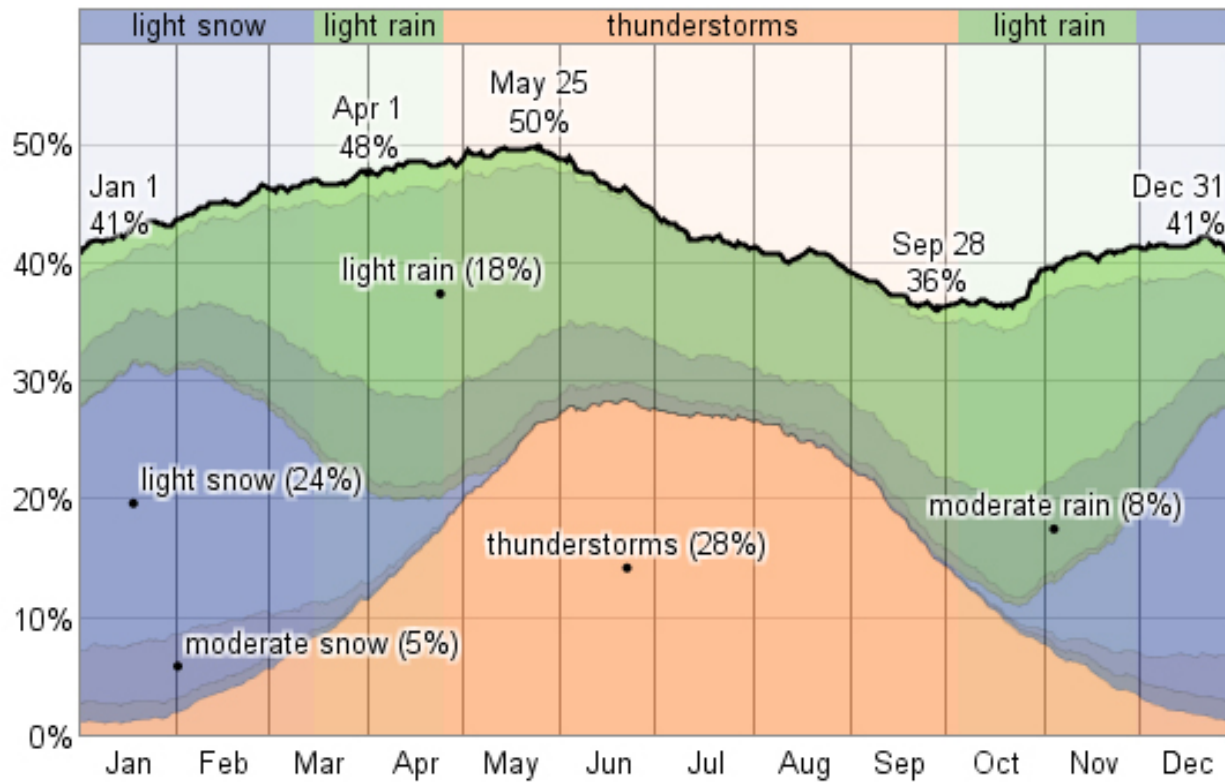
www.usclimatedata.com

Average annual precipitation (rainfall): 39.06 inches

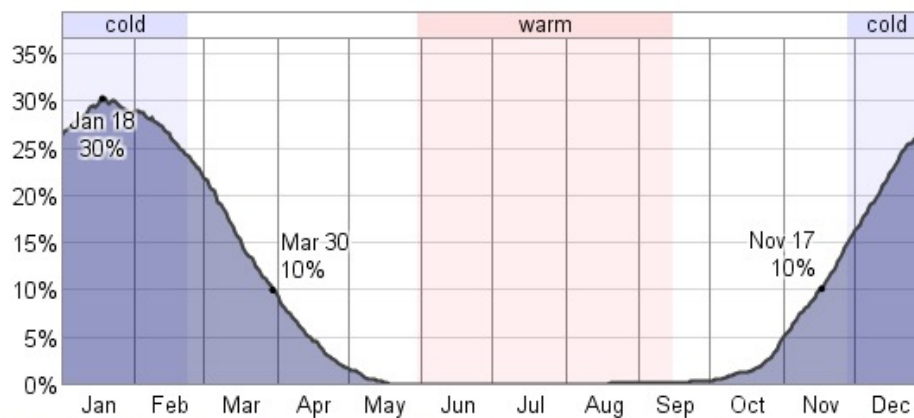
Average annual snowfall: 12 inches



Probability of Precipitation at Some Point in the Day



Probability of Snow Fall Being Reported in a Given Day



Probability that snow will be reported at least once in a given day. The season is defined as the period during which the probability is greater than one third the maximum probability.

WIND AND DIRECTIONS

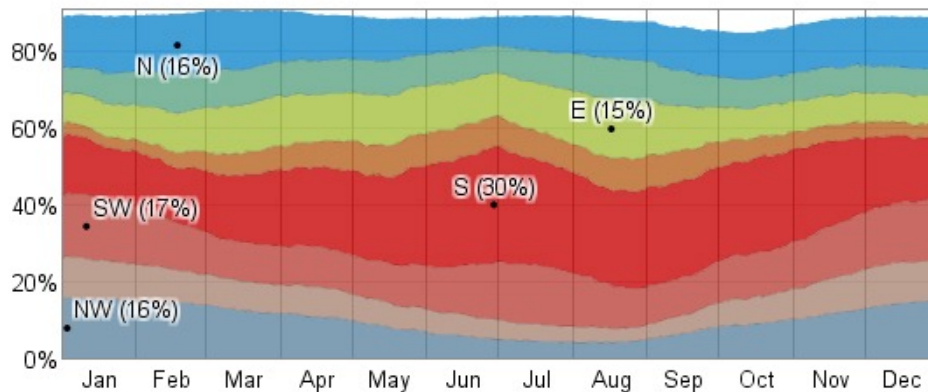
Prevailing wind is generally coming from a South / Southwest direction at approximately 11mph. The highest average windspeed is 18 mph around April 2, and the lowest average windspeed is around August 30, which is around 14 mph.

Wind Directions Over the Entire Year



The fraction of time spent with the wind blowing from the various directions over the entire year. Values do not sum to 100% because the wind direction is undefined when the wind speed is zero.

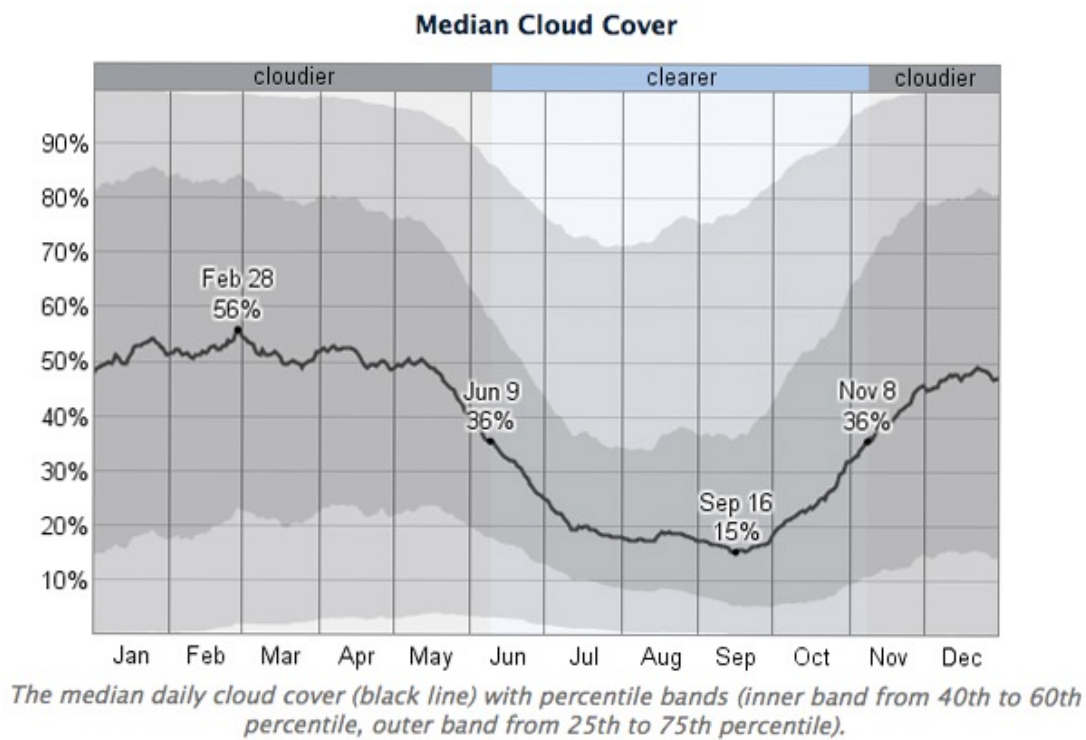
Fraction of Time Spent with Various Wind Directions



The fraction of time spent with the wind blowing from the various directions on a daily basis. Stacked values do not always sum to 100% because the wind direction is undefined when the wind speed is zero.

CLOUD COVER AND TYPES

“The median cloud cover ranges from 15% to 56%. The sky is cloudiest on February 28 and the clearest on September 16. The clearer part of the year begins around June 9. The cloudier part of the year begins around November 8” (www.weatherspark.com).



NOTE: Because one of the hottest parts of the year also has the lowest windspeed and the lowest cloud cover, it's important (by the first of August) to have as much ground cover and mulching in place to prevent the drying of the soil. Precipitation patterns also require this, as the average rainfall drops from August through September. These will, in turn, be the highest months for irrigation costs.

SITE HISTORY

OWNERSHIP AND OCCUPANCY

The site was build throughout the 1960's, but several phases were added on over the years.

Occupancy of the building have changed multiple times since the building was originally owned.

- 1960-70's: Rockhurst University used this facility as a place to house it's professors and several Jesuit monks who were a part of the faculty. At least part of the facility was used to house juveniles who were labeled as "at risk teens", dealing with drugs, addictions, and behavioral problems.
 - 1980's: Rockhurst began sharing the facility with Notre Dame d'Sion, the girls private school and transitioned the facility over to mostly office use with fewer residents.
 - 1990's: Notre Dame d'Sion began sharing the facility with the New Hope United Methodist Church, which grew substantially in the late 90's.
 - Early 2000's: New Hope United Methodist Church takes over the ownership of the property and begins leasing to The Daniel Academy in 2006. At the time of The Daniel Academy taking over primary use the building, the property was in pretty rough disrepair. New Hope UM Church did not allow major repairs or property work to be done within the rental agreement. During the early 2000's invasive species took over many area (honeysuckle, Chinese Elm, poison ivy, Virginia creeper, and Bermuda grasses were among the dominant species).
 - Primary commercial grasses: Bermuda grass was located along all major property edges and a tall fescue covered the remainder of the commercial area.
 - 2013-14: The Daniel Academy purchases the building and begins environmental remediation efforts and the introduction of permaculture design into the outdoor landscape.
 - **2013 Summary**
 - East courtyard garden: We planted all native perennials & herbs for pollination and culinary purposes.
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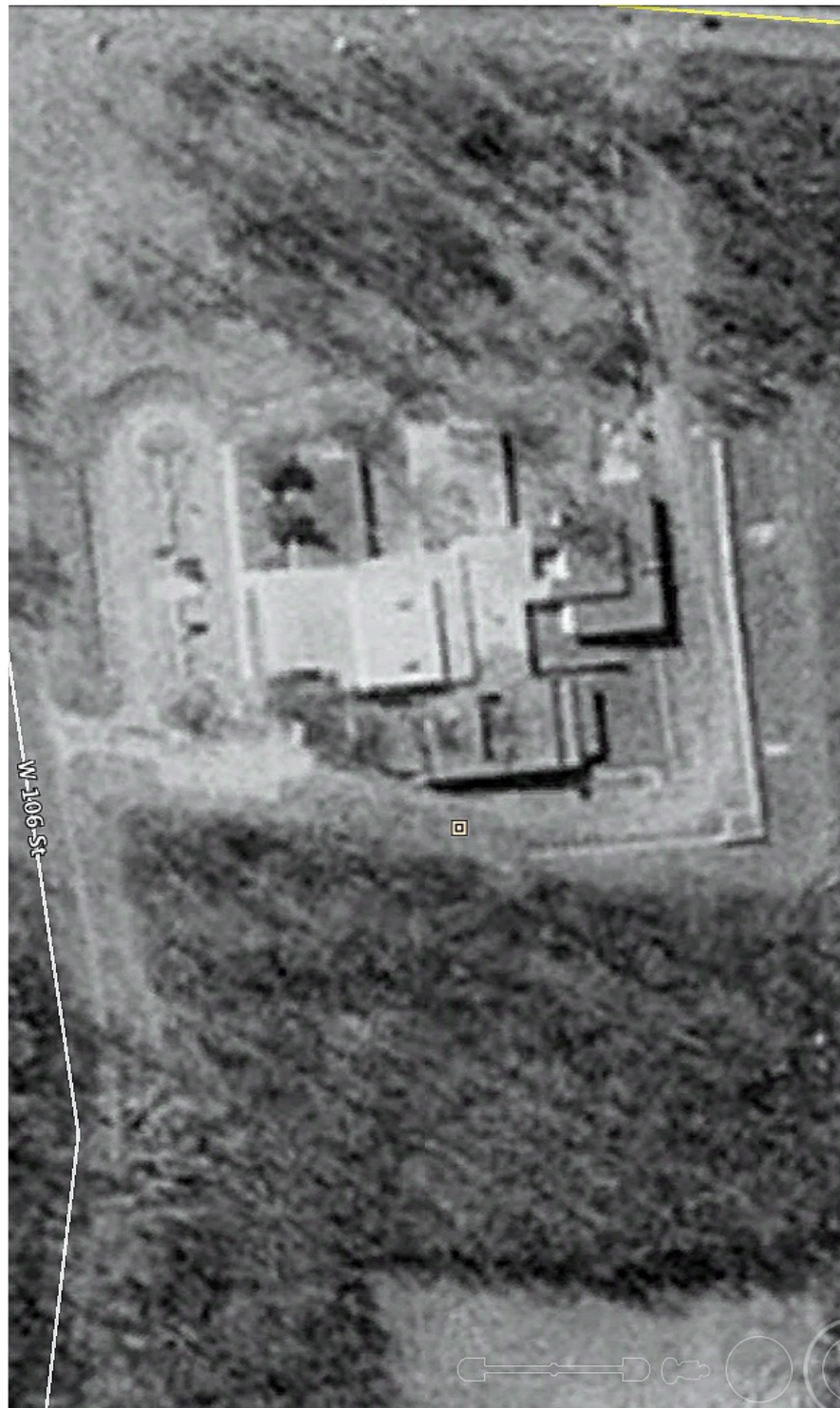
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- East wing front garden: We planted 30 purple cone flowers, blazing stars, black eyed Susans, and over 200 heirloom garlic plants. We planted flowering Saskatoon bushes, butterfly bushes, and are preparing to line our driveway with burning bush hedges.
 - East Gate Garden: Wood-chipped and ready for spring planting
 - Outdoor lunch edible garden (West wing): Wood-chipped and ready for planting. We planted spring bulbs, ferns, hostas, wild ginger, etc. in the shaded area.
 - Plantings included:
 - 8 Pecan trees (in the green tubes along 106th St)
 - 8 Hazelnut trees (in the green tubes along 106th St)
 - 4 Black Walnut trees
 - 32 Apple trees around the property (Gala, Jonathan, dwarf Jonathan, Macintosh, Granny Smith Greens)
 - 8 Serviceberry bushes between C wing and Elementary
 - 8 Elderberry (medicinal) between C & D wings
 - 2 Witch Hazel (medicinal) between C & D near lunch tables
 - 2 Mulberry Trees (near Elementary drive)
 - 12 Canadian Saskatoon bushes (near Z-wing retaining wall and in front of JI drive area)
 - **2014-15 Summary**
 - Remediation efforts continued as students at TDA covered 3 more acres with 6" of wood chips and compost.
 - TDA began working with "GROW NATIVE", a local wholesale perennial flower distribution center to plant wildflower areas on campus. Students introduced over 50 species of native perennial wildflowers in one school year.
 - Additional trees and shrubs introduced to the property in various quantities: blueberries, currants, strawberries, cherry, blackberry, raspberry, paw paw, and persimmon.
 - Nitrogen fixing trees and shrubs planted in new food forest areas: shrub indigo, false blue indigo, black locust, thornless honey locust, and japanese pagoda trees. Legumes planted at the base of every stone fruit tree.
-

VISUAL GOOGLE EARTH IMAGES OF THE SITE

1991



1996



2002



2005



2012



2014

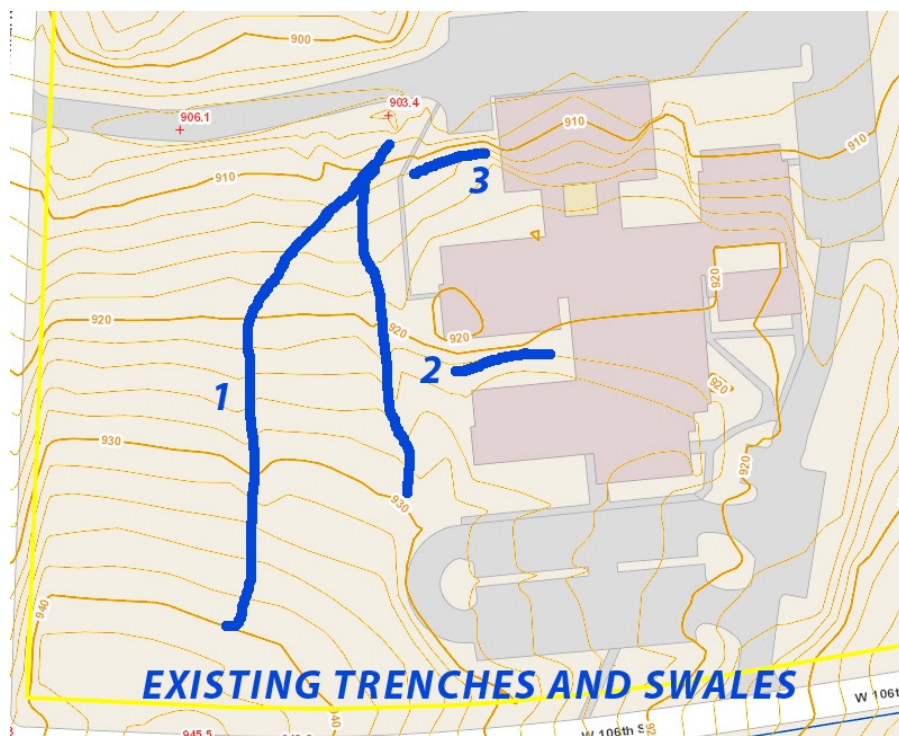




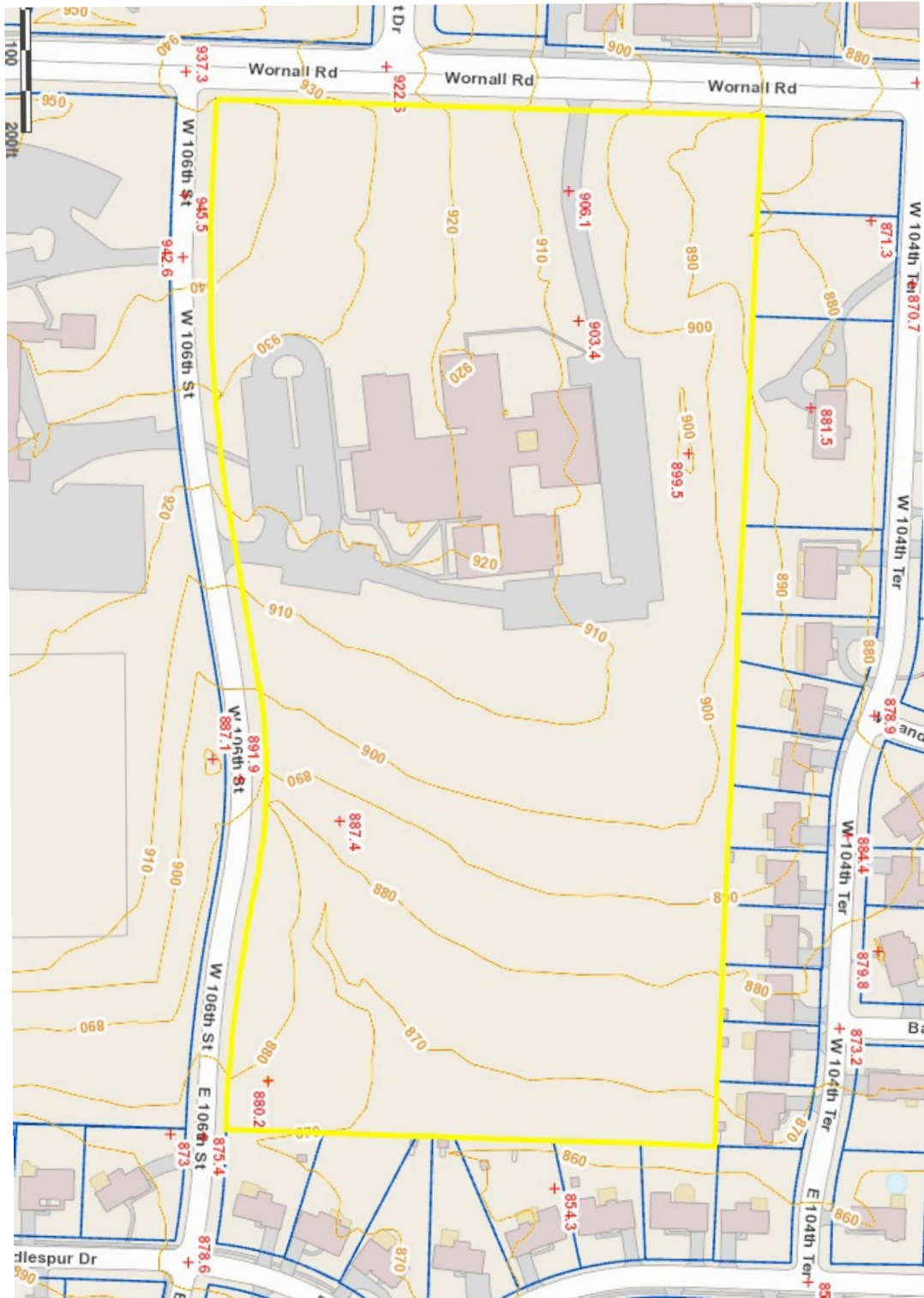
CONTOURS

EXISTING SWALES

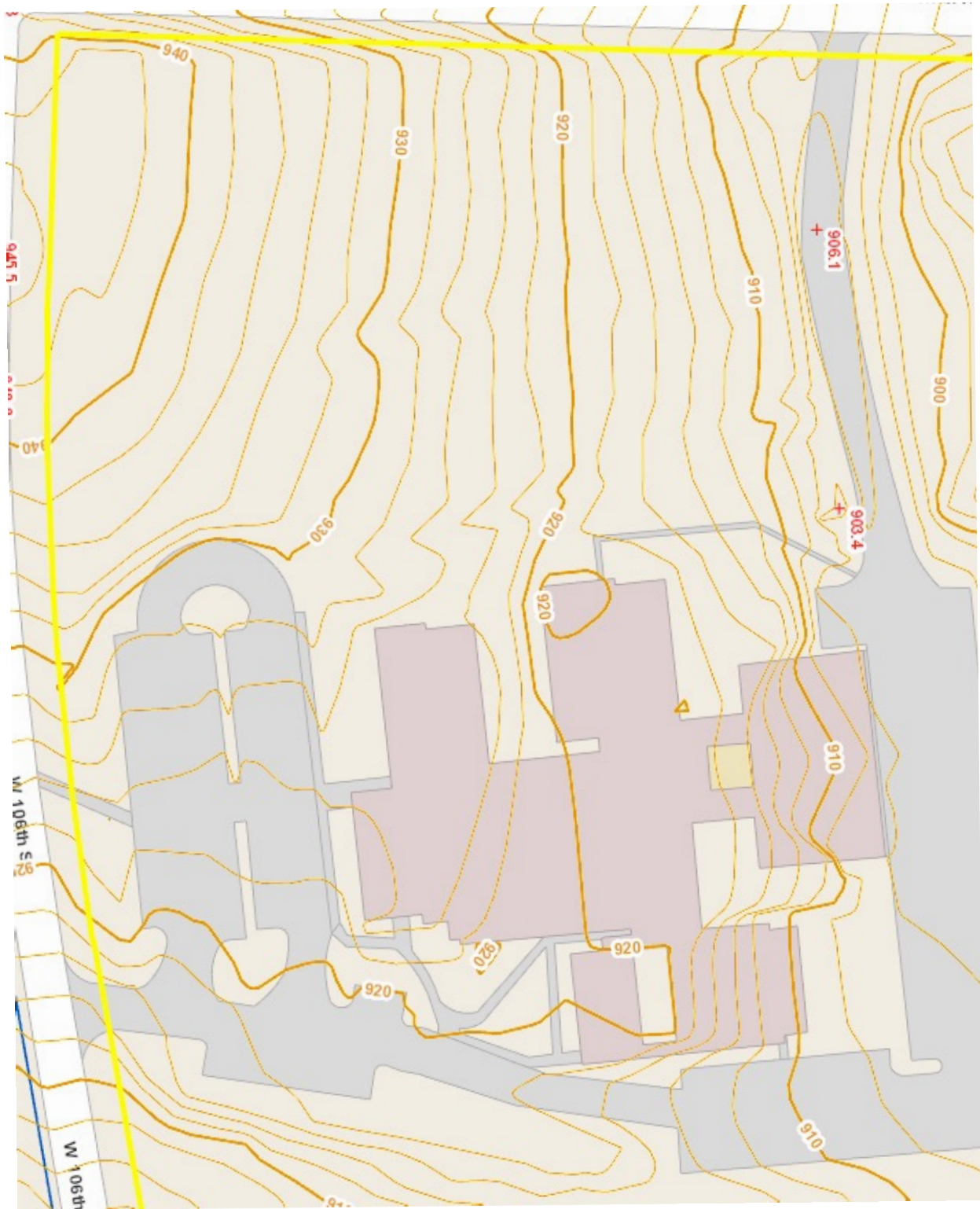
Upon entering the site, there are three major existing swales that were likely used primary for drainage and to direct water away from the building. The first one is on the western side of the property and is a 2 foot drainage trench that stretches from one end of the property to the other. This primary trench runs downward from this highest to the lowest point on the western part of the property, but does not follow contour. It should be fairly easy to connect three other swales to this ones in order to divert the flow longer and keep it on contour. The second is between the C & D wings (D-wing being the highest point, sloping north downward toward the C-wing), and this swale follows contour perfectly. The third swale is on the edge of the C and Elementary wings (C-wing being the highest point, sloping down toward the elementary parking area), also following contour.



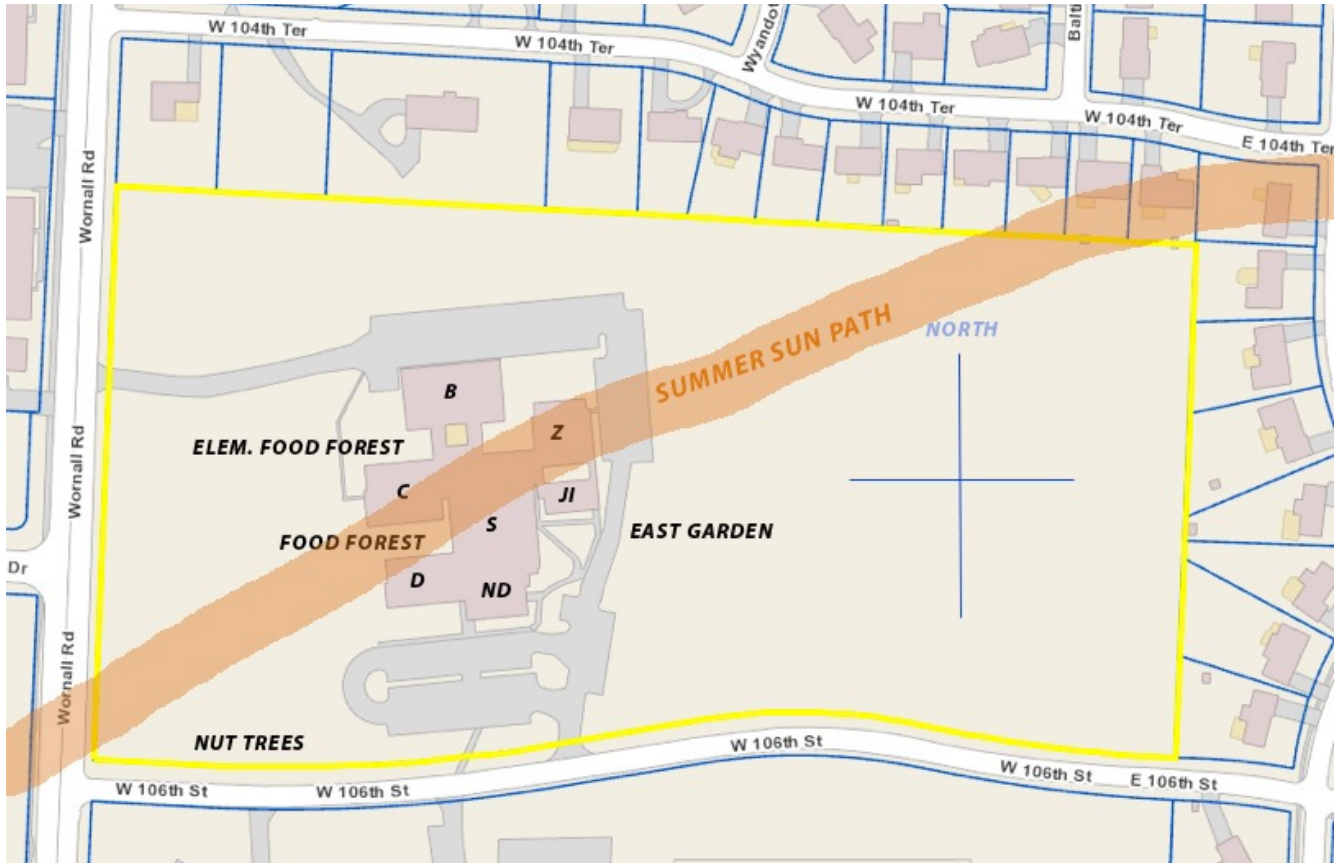
PROPERTY-WIDE CONTOUR LINES



CONTOUR AROUND PRIMARY STRUCTURE



CURRENT SITE MAP | NO CONTOURS



Descriptions

- B Elementary classroom wing
- C Junior High wing (grades 7-8 and executive classrooms)
- D High School wing (grades 9-12 and admin offices)
- JI Joseph International (marketplace training and equipping offices)
- ND New Day Offices (rented tenants)
- S Main Auditorium
- Z Offices and Kindergarten classes

ZONE SUMMARY

Being a school, the site traffic has the ability to shift dramatically based on various classroom activities and the specific units a particular class may be studying. For example, the wooded zone might be considered a 4 or 5 for 90% of the year, but students may be in the woods every day for several weeks depending on the time of year.



Generally speaking, however, the daily routine of the building and site use can be generalized into the following categories:

RED **Zone 1:** Areas used daily by staff, students, and interns. These areas include the outdoor children play areas, school entrance, outdoor eating areas, and the native perennial gardens.

BLUE **Zone 2:** Areas visited 3-4 times per week by students and faculty. These areas include the eastern garden and the two existing food forests. While these areas are visible on a daily basis, work projects take place in these areas only a few times per week.

YELLOW **Zone 3:** Areas visited once a week or every other week by students and faculty. These areas include the hardier fruit and nut trees, shaded wood edges, and the property line. These areas are visited weekly for mowing or commercial care, but they are not frequented by the school-wide population.

GREEN **Zone 4-5:** Areas visited only rarely by students and faculty. These areas include the western property edge and the wooded acreage. These areas often contain high amounts of invasive understory and poison ivy, so they are not frequented often. However, both areas have many native nut trees (hazel and black walnut) and mulberry bushes. The eastern wooded zone contains a high wildlife population including:

- Deer
 - Hedgehog
 - Red-tail Fox
 - Raccoons
 - Rabbit
-

-
- Squirrel
 - Wild Turkey
 - Canadian Geese
 - Predatory birds: Bald Eagles, Cooper's Hawk, Red Tailed Hawk, Turkey Vultures.
 - Song birds (one local birder counted 40+ species in one outing)

ZONES IN PHASE 1

INTRO TO PHASE 1 OF THE GARDEN AREAS

Each of the following zones were a blank canvas when we started the installations two years ago. The first year was primarily spent learning about the land, the property, the soil, etc. During this year, we had about 25 dump truck loads (5 cubic yards per load) of ramified wood chips brought in. The first two loads of chips were applied to the few commercial areas (traditional landscape with yew bushes and eastern redbuds) and then we used the remainder of the wood chips for areas we knew would eventually become gardens. We applied the wood chips with mycorrhizal inoculant and let the land rest for about 14 months in order to start the soil repair work. We added fresh compost from our school lunchroom, leaves, hay, and grass clippings from all over the property. This process has continued over the last 2 years, and we have made incredible process on the soil quality.

In some areas, phase one planting has begun. After talking with the administration of the school, they are more than comfortable with the permaculture techniques, provided we are able

to keep a somewhat “professional / commercial” curbside appeal on the front of the building. So recently, most of our efforts have been in-between classroom wings of the building, where students and staff would be able to see and monitor the progress.

The wood-chipped and mulched areas have been a significant portion of our manual labor. Last year, we had 25 students working 6 hours a week spreading wood chips and mulch to key areas. These students began installing the first key elements of our food forest. Once they are in the ground (by June 2015), we will finish the ground cover and let native perennials take over. We are working with CritSite / GrowNative organization to restore much of our property to native savannah to function as a city wildlife habitat. In 2014, we applied and received recognition from the National Wildlife Federation to become a certified eco-school and wildlife habitat. The organization has sent representatives from our city twice in 2014-15 to monitor the progress and work on the property. Both times, the representatives left very pleased.

Phase one planting is now complete (as of May 18, 2015) and we are ready to begin the next set of phases in the food forests. The following is a summary of the work included in our first two years work (Aug 2013 - May 2015)

ELEMENTARY FOOD FOREST INSTALLED 2013-15

When we entered the site, Bermuda grass covered much of the area and it was heavily populated with ticks, chiggers, and fleas. The building has a great deal of old windows, which are not thickly paned, so we decided to plant fruit and berry bushes in order to cool the area in the summer and let in the light during the cold winter months. The service berry tree / bushes will give us a 12' taller bush, while the currants, blackberries, and comfrey will be a great shrub layer. We have already started planting strawberries, legumes, and herbs around the base of the trees as well (though these are not shown in pictures).

It's taken us two full years to kill off the Bermuda grass in the gardening areas with 8-10" of wood chips. Though this initial step really felt like a set back at first, we are beginning to see the benefit of what happens when you spend time repairing the soil.

BEFORE INITIAL PLANTING BEGAN IN THE ELEMENTARY GARDEN



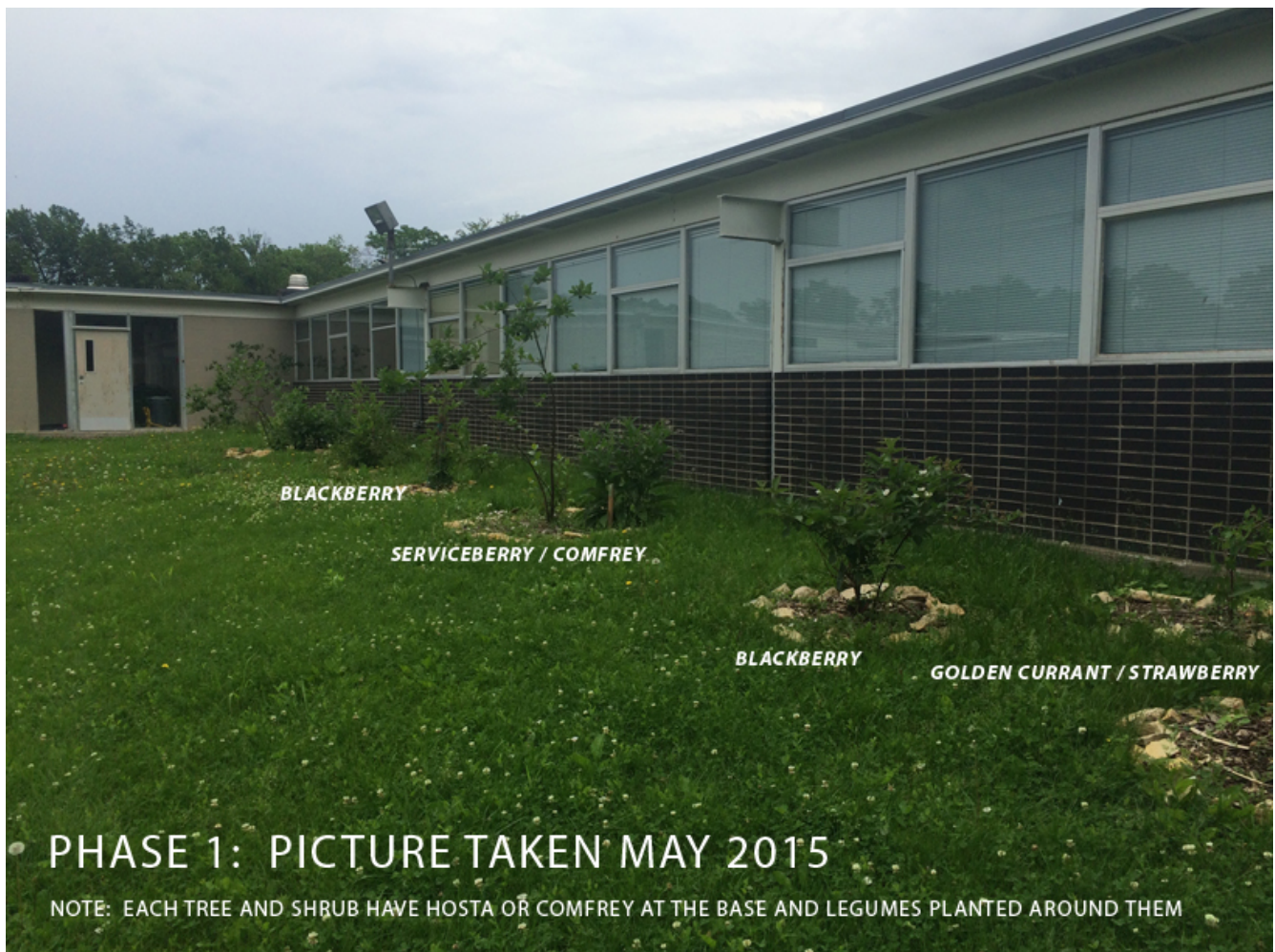
Perennial Crops

- Apple Trees (4 cultivar)
 - Mulberry, *Morus rubra* (2)
 - Serviceberry bushes, *amelanchier arborea* (6)
 - Raspberry (3)
 - Blackberry, *Rubus fruticosus* (3)
-

- Golden Currant, *Ribes aureum* (2)
- Black Currant, *Ribes nigrum* (2)
- Jerusalem Artichokes / Sunchokes, *helianthus tuberosus* (25lbs)
- Comfrey, *Symphytum officinale* (initially in 25 different areas for chop/drop)
- Strawberry (200 plants)

Annual Crops (not pictured)

- Sweet Baby Pie Pumpkins
- Acorn Squash
- Zuchinni
- Hutterite Beans
- Painted Pony Beans
- Brandywine, green zebra, purple krum, and blush heirloom tomatoes
- Holy basil
- Garlic / Onion Chives





FOOD FOREST (BETWEEN C & D WINGS) INSTALLED 2014-15 (AND CURRENT PROJECT AREA)

This area has quickly become one of the favorite places for students to work. It's nestled between two of our classroom wings and is visible from many of our classrooms. When we first occupied the property, this area was overgrown and neglected. We removed a great deal of brush and cleared it away from the building. Gardening students added wild clover seed to the ground to begin to repair the soil, and this became a holding place for much of our mulch, grass clippings, and compost from the school year. Students wanted to spend a full two years repairing soil before planting (2013-15), so starting in March 2015, we planted our first phase in the food forest area. The full planting list is below, however many of these are very young saplings, so are not very visible at this publication date.



Once we began planting in this area, the wildlife immediately came back. First started filling the bushes, deer came up between the building, and even geese came to sit on the roof. We decided to go with shrubs near the window and the dwarf apple trees in the center, so each classroom will be able to have the same view. In addition, this is a full sun area much of the day, which means the deciduous bushes will provide shade for the windows during the summer and let the light inside during the winter. This area has a natural slope, which is accounted for in our longer-term design of the area. (see Phases 2-3)

Perennial Crops

- Apple Trees (6 cultivar)
- Elderberry Bushes, *Sambucus canadensis* (10 bushes of two varieties)
- Serviceberry bushes, *amelanchier arborea* (4)
- Blueberry (16 bushes of 4 varieties)
- Witch hazel, *Hamamelis virginiana* (4)
- Comfrey (initially in 25 different areas for chop/drop)
- Hosta, *Agavoideae* (10 varieties with four plants at the base of every fruit tree and bush)



Annual Crops

- Black Valentine Beans (base of each tree / bush)
- Hutterite Heritage Beans
- Calypso Beans
- Garlic / Onion Chives

Native perennial wildflowers

- False Blue Indigo (baptista as a nitrogen fixer)
- Lead Plant (as a nitrogen fixer)
- Shrub indigo bush (*Amorpha Fructosa* as a nitrogen fixer)
- Purple Prairie Clover (as a nitrogen fixer)
- Purple cone flower (echinacea)



purpurea)

- Globemaster (*allium giganteum*)
- Blue Sky Aster, *Symphyotrichum oolentangiense*
- Black-Eyed Susan, *Rudbeckia fulgida*
- Bee Balm, *Monarda didyma*



NOTE: In May 2015, we installed this outdoor fire pit and classroom area. We have more stumps being cut for stools and the area has already been used by student groups after school. This area was completed by the student government of The Daniel Academy, under the leadership of Patrick Bondy and Anna Brymer.

JI COURTYARD GARDEN

This courtyard in our “Z-wing” is fully enclosed by the building. Since it’s on the eastern side of the building, it gets the perfect amount of sun and daylight for a perennial flower bed. We wanted to create an area for our elementary students to study butterflies and birds, so each of the species we selected are excellent pollinators, which in turn, benefits the rest of the property. This garden was started in 2013 as our first major project, and is continued to be maintained currently. This wildflower patch started out as an over grown “bush”, but is now home to butterflies, bees, and more types of birds than we know what to do with. Wild Birds Unlimited, a local birding and feeding company, heard about our project with the students and had supplied all of the feeders and birdseed for free. They keep us stocked up regularly and have visited the property to see the progress and work with our students in the classrooms.



Native Wildflowers and pollinators

- False Blue Indigo, *Baptisia australis* (nitrogen fixer)
 - Lead plant, *amorpha canescens* (nitrogen fixer)
 - Purple cone flower, *echinacea purpurea*
 - Blazing Star Liatris, *Liatris spicata*
 - *Penstemon digitalis*
 - *Penstemon cobaea*
 - Golden Alexander, *Zizia aurea*
 - Prairie milkweed, *Asclepias sullivantii*
-

- Kankakee mallow, *iliumna remota*
- Praise sundrops, *oenothera pilosella*
- Bush coneflower, *echinacea paradoxa*
- Anise Hyssop, *agastache foeniculum*
- White Wild Indigo, *Baptisia alba*
- Columbine, *aquilegia canadensis*
- Rattlesnake Master, *eryngium yuccifolium*
- Butterfly Weed, *Asclepias tuberosa*
- New England Aster, *Aster novae-angliae*
- Lance-Lead Coreopsis, *Coreopsis lanceolata*
- Culver's Root, *veronicastrum virginicum*
- Various heirloom sunflowers



Annuals in the Courtyard

In 2015 we added some annuals to fill in some of the spaces and create something easy for kids to harvest. In the winter of 2014, we added 50 heirloom garlic plants, 25 Kale, and multiple types of dried beans for students to harvest later in the year. These have filled in perfectly and are at the time of this publication are being harvested almost daily. The garlic is forming scapes, which are nearly ready to be cut off and distributed for purchase. The dried beans help us repair nitrogen in the soil and serve as object lessons in the classroom for many of our elementary classes. In 2015, all of our bean trays (280+ plants) were grown by students in elementary classrooms. The high school students helped them plant them all over the property.



EASTERN GARDEN

This area is along the edge of a drive that families use daily for pick-up and drop off. We spend most of 2013-14 repairing the soil and covering it with compost and wood chips. Then in 2015, students planted annual crops and perennial herbs (for insect and rodent repellent). Because this area is not fenced in until the next phase, it's expected that rabbits will have free range in this area, so the harvest size might be smaller for phase 1. The image below was taken early in the season, so most plants are not yet in the ground.

We have reused logs from fallen trees on property to form our border along the driveway, until we can install something more permanent.



Annual Crops

- Butternut Squash
- Acorn Squash
- Sugar Baby Watermelon
- Jerusalem Artichokes (tall back border)

Perennial herbaceous border around eastern garden

- Garlic chives
- Onion chives
- Mint (10-15 varieties)
- Hyssop (Augustache)

Dwarf Trees & Shrubs on East Side of Building

- Apples (8 varieties)
- Persimmon, *Diospyros virginiana*
- Paw Paw, *Asimina triloba*
- Golden Currant, *Ribes aureum* (2)



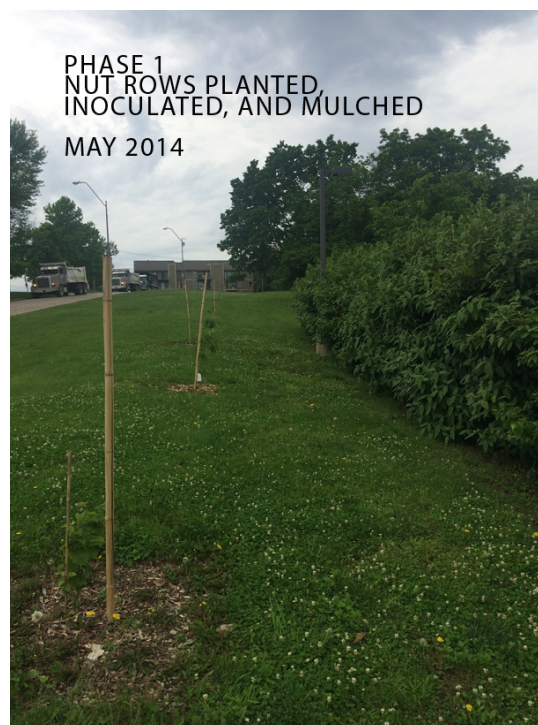
NOTE: When initially planting the trees, we acquired some mushroom inoculant, as per the recommendation of Paul Stamets, one of the world's leading mycologists, and we inoculated the roots with a mycorrhizal powder. All Fruit trees have all been planted with a small polyculture guild surrounding them, including: hosta (chop and drop), comfrey (bio-accumulator), onion / garlic chives (pest control and pollinator), strawberries (student enjoyment), or mint (insect control). This polyculture creates the first phase in biodiversity, but should fill in after 3 years to cover the area to a much greater capacity. In addition, students have made Sepp Holzer's bone-sauce to protect all of our fruiting and nut trees. After experiencing severe damage last year, we haven't had a single bit of deer damage since we applied the deer bone sauce.

NUT TREE GROVE (ON SW SIDE NEAR 106TH ST)

Nut Trees

- 6 Hazelnut, *Corylus Americana*
- 6 Precocious Pecan
- 3 Black Walnut, *Juglans nigra*

NOTE: All the nut trees are kept as isolated as possible because of students at the school with severe tree nut allergies. A large row of viburnum separate the nut grove from the parking areas, and we have planted several fruit trees along the swale to also act as a buffer zone, but these are all in their first phases as of May 2015. It is likely that going forward, a small retaining wall and water catchment will be added in order to separate the nut trees from students further and to block more of the road view from 106th Street.



Over-story Fruit Trees

- 4 Persimmon
- 4 Paw Paw
- 4 Apple



NOTE: This area has an embankment around the parking lot. In phases 2-3, we will turn this area into a permaculture-styled swale to expand the food forest systems. In phase one, we have a few trees installed, but needed to continue the pattern of the older crab apple trees next to it. So, in order to make this a functional swale, we need to do some earthwork, because currently the runoff water goes into the parking lot and doesn't stop coming down the hill. Uphill (left side of picture) it continues to incline, what what is visible, so we have 2-3 places we can add the swales before we continue to plant the food forest. Our goal for phase one was to get a few trees in place, but allow enough room between them to bring in equipment.

ZONES

PHASE 2

2015-17 SCHOOL YEARS

During this next phase, the plan is to take two full school years to accomplish the following goals and continue maintaining the current system. By the end of this period, many of the perennial plants, berry bushes, fruit trees, and wild flowers will be producing at a much higher yield.

Because of the maturity of the system, some areas will require varying degrees of maintenance... some a bit more, some a bit less. However, there are a few key goals for the second phase, preferably met in this order:

- 1. Install a chicken coop in the elementary wing in the north central end of the building (between elementary and Z-wings).**
 - 2. Have both food forests fully wood chipped or covered with a perennial cover crop that we can chop and drop for bioaccumulation of nutrients.**
 - 3. Plant give different nitrogen fixing trees on the western side of the property (primarily for coppicing)**
 - 4. Double the number of plants in each of the food forests, focusing on the shrub, root, and herbaceous layers.**
 - 5. Have edible landscape along the front of the Z-wing near the parking lot. This garden should be a “sample garden” of what we are trying to accomplish across the property, but needs to have a professional appeal, because it’s so near our entrance.**
 - 6. Plant tree nut guilds in the front of the building along 106th Street.**
-

-
- 7. Finish apple tree guilds (by adding shrub and bush layers with place for annual nitrogen fixer)**
 - 8. Plant perennial wildflowers along the eastern JI garden (woodland shade mix from Prairie Moon Nursery).**

Phase 2 | Part 1: Chicken Coop Layout

For the first project in the summer of 2015, we are bringing in chickens that we have been free-ranging off site since early March. This project will take most of the summer to complete and work out most of the kinks. There are several hazards that we have to take into account including a cooper's hawk, raccoons, and a few foxes. Because of these factors, the completion of this project will take longer than first expected, so we can do it right without losing our hens.

Stacked Functions of the Chicken Area

1. Create a learning and hands-on lifeskill experience for our students. We will be using the animals in multiple courses (i.e. biology students can use it in multiple units: studying bacteria, protozoa, and composting insects and microorganisms).
 2. Provide eggs for the school faculty and families in need.
 3. Composting system for the school's food scraps that we will start collecting daily in our lunchroom. All of this will become manure production and fertilizer for our gardens.
 4. Chicken meat, which will be processed and donated to families within the school district.
 5. Weeding and garden bed prep (using the Chicken Tractor Model), which can be moved around our campus every week.
-

CHICKEN COOP PLAN FOR SUMMER AND FALL 2015



CHICKEN COOP DESCRIPTIONS AND FUNCTIONAL ELEMENTS

Entrance Path

We are using a wood chip path, so it will retain moisture and amend the soil at the same time. On each side of the path, we are working with CritSite and Grow Native to create a wildflower patch to re-create a native savannah. This will host many butterflies and beneficial insects and provide a bit of “cover” coming up to the chicken coop. At the top of the path, we have a 6’ wooden fence to install that will block the view of the chicken coop from the back parking lot, in order to maintain the “commercial front” desire of the property owners. In addition, the wildflowers will be a sound barrier between the chickens and the playground. Lastly, we are planting perennials that use a significant amount of nitrate and can neutralize (or absorb) the urine or chicken poop that might wash down the hill.

Paddock System

We will use an electric net (.1 jules) to create four quadrants that can be rotated in order to allow spaces to grow cover crops when we are not using the chickens out on the school grounds using the tractor system. We will use a 2 month rotation:

Week 1: Quadrant 1 with wood chips

Week 2: Chicken tractor system around property

Week 3: Quadrant 2 with grass, shrub indigo bushes, blueberry bushes, and catmint

Week 4: Chicken tractor system around property

Week 5: Quadrant 3 with clover mix (used for deer feed plots), rose bushes, and comfrey.

Week 6: Chicken tractor system around property

Week 7: Quadrant 2 with grass, comfrey, and sage.

Week 8: Chicken tractor system on property

This paddock system will be controlled with the electric mesh fences (solar powered) and the mobile coop will come with us when it's needed around property. We will use a timer, in order to keep it off during outdoor recess times. It takes 3-4 guys (or students) and about 25 minutes (half a class period) to move the entire unit and get the fence set up in the new location. We will also have two mobile units to go with the coop: a dust bathing pen and crushed shells / sand for grit to clean their gizzards. When in the main pen, the chickens will have some shade and air protection from two dwarf peach trees (**DP**).

For food and water, we are only supplementing with nonGMO grain during the growing months, but will need to use some bagged food during the winter if school lunch scraps are not enough. Water in our building is city water, and we do not have any water catchment around the building (it's all underground), but we will be adding garlic cloves to the water for natural antibiotic and fungal treatment.

Quadrant 1

The upper right quadrant of the chicken pen will be covered in wood chips. Though the chickens will process this and it will decompose over time, it will at least serve as erosion control, so our soil doesn't go downhill. In this area, we will plant rose bushes (labeled **R**) for protection shrubs for the chickens. Secondly we will have catmint (**CM**), which is both edible and a great insect repellent to keep ticks and fleas at bay. Third, we will plant a tall sage (**S**), which is edible, medicinal, pollinator, flea deterrent, and will hide the caged in air conditioning units (**AC**).

Quadrant 2

The upper left quadrant will be a grass cover, which will be able to grow back in the 7 weeks before they chickens will return to this

area. Along the edge, there will be blueberry bushes (**BB**) for food for us and/or chickens), catmint (**CM**), and shrub indigo (**SI**).

Quadrant 3

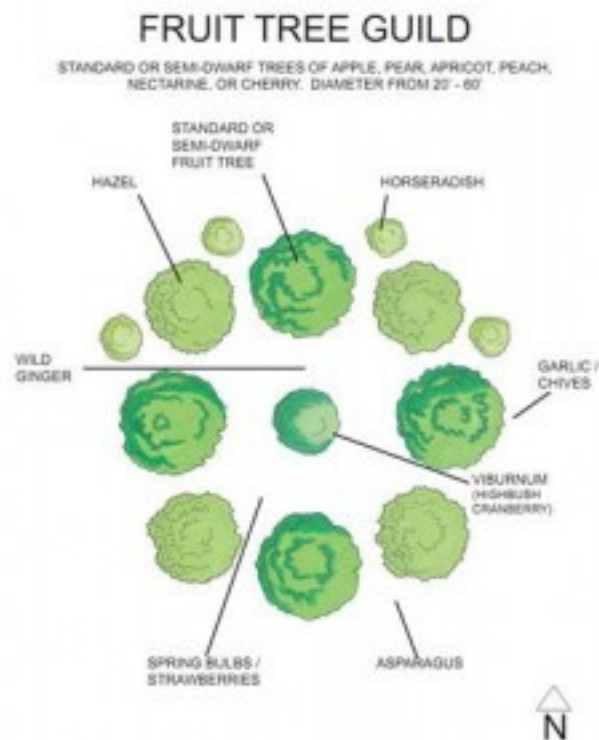
This bottom left area will be planted with a clover mix, which was a suggestion of a local permaculturalist. Usually this mix is used for natural deer feeding plots, but he said his chickens loved it, so we are going to give it a try. This area has rose bushes for chicken food and protective cover, and will also hide the walls of the building a bit for cooling, as will the shrub indigo (**SI**). We will also have multiple comfrey (**CM**) plants along the back end (south) of the area. This will stabilize the eroding soil there, provide micronutrients for the chickens, provide additional spring pollination, and will be a great chop and drop ground cover.

Quadrant 4

The final fourth quadrant will be covered in a native grass to start, and with our rotation, hopefully will be able to grow back completely before the chickens return to the area. This area will be the primary composting area for the chickens and it receives some of the most intense sun on the property. The partial cover off the dwarf peach (**DP**) will likely need to be supplemented by an awning of some sort. Finally, we will use the same sage (**S**) to edge this end of the building, because it serves as tick and flea control. We may also add catmint (**CM**) and other herbs. The building door in this quadrant is only used in the case of emergency, but we are debating on using it to drop off compost when it's not being used in other areas the property.

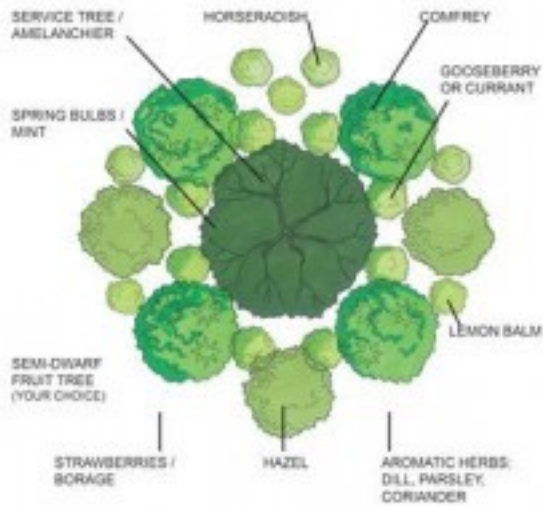
Phase 2 | Part 2: Wood Chip and Cover Crop in the Food Forests (2015-17)

For the second phase of the food forests, we will begin to stabilize the system with the various layers of a food forest. We will be using a guild method in order to create the most biodiversity on the property. For cover crops, we will use a wild clover cover crop that can be used by chickens and place the existing grasses. Three sample guilds we will be using have been created by Midwest Permaculture, and we plan on using their proven guidelines and recommendations for other polyculture guilds (www.midwestpermaculture.com).



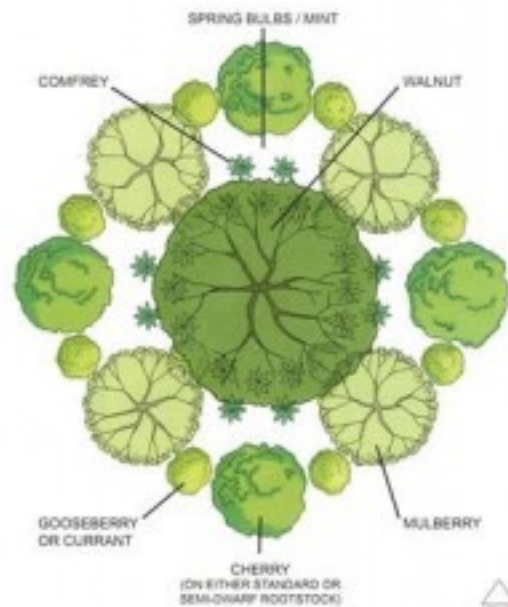
SERVICE TREE GUILD

DIAMETER FROM 20' - 50'



WALNUT GUILD

APPLIES TO WALNUT, BLACK WALNUT, BUTTERNUT, HEARTNUT

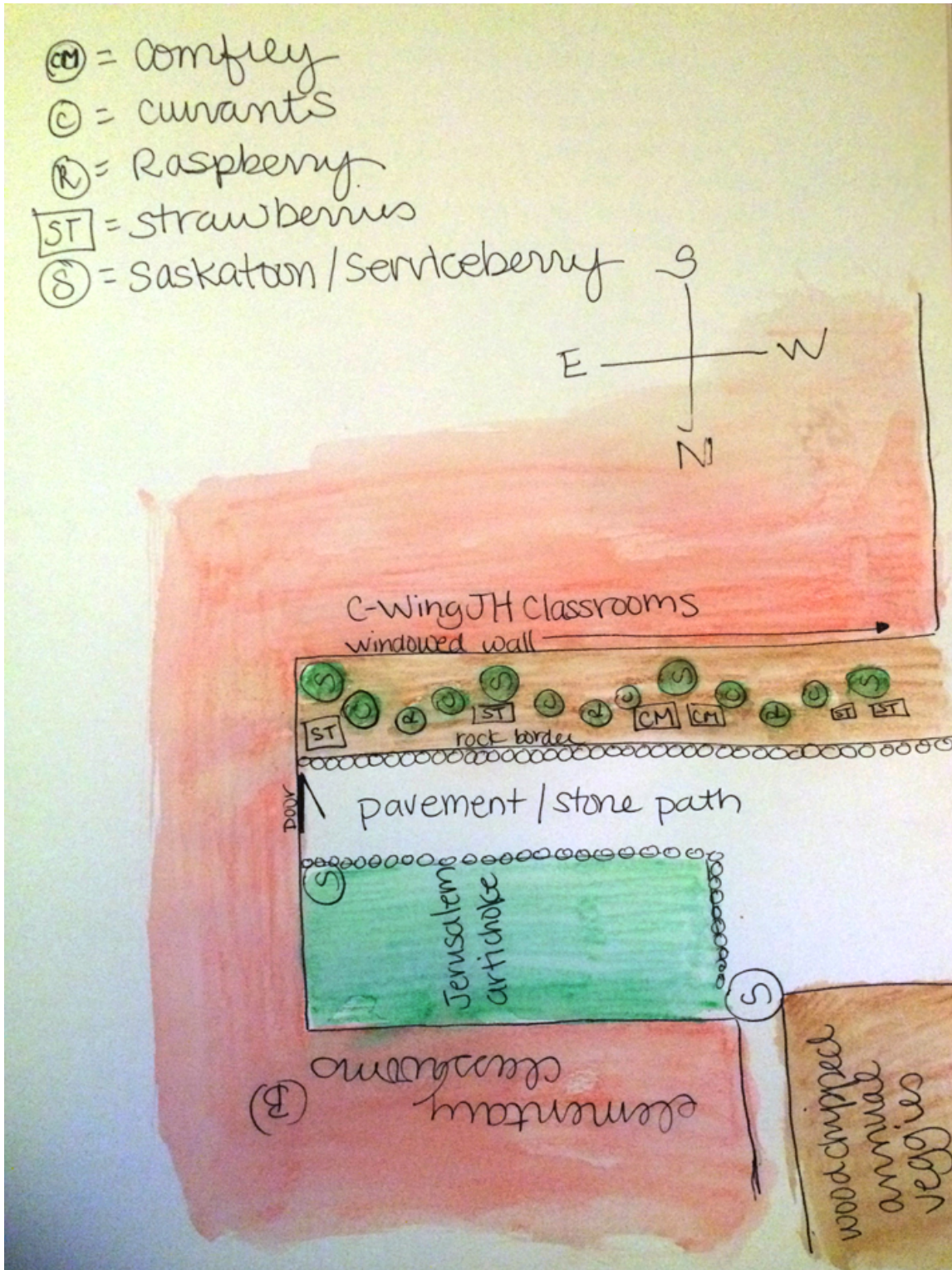


As the previously planted shrubs and bushes fill in (or die back), we can decide which ones to keep and which species to thin out in the succession process. Below is a diagram of the two food forests we are working toward over the next to years. With the base elements, trees, and bushes in place, it will be only a few years before things start to naturally fill in.

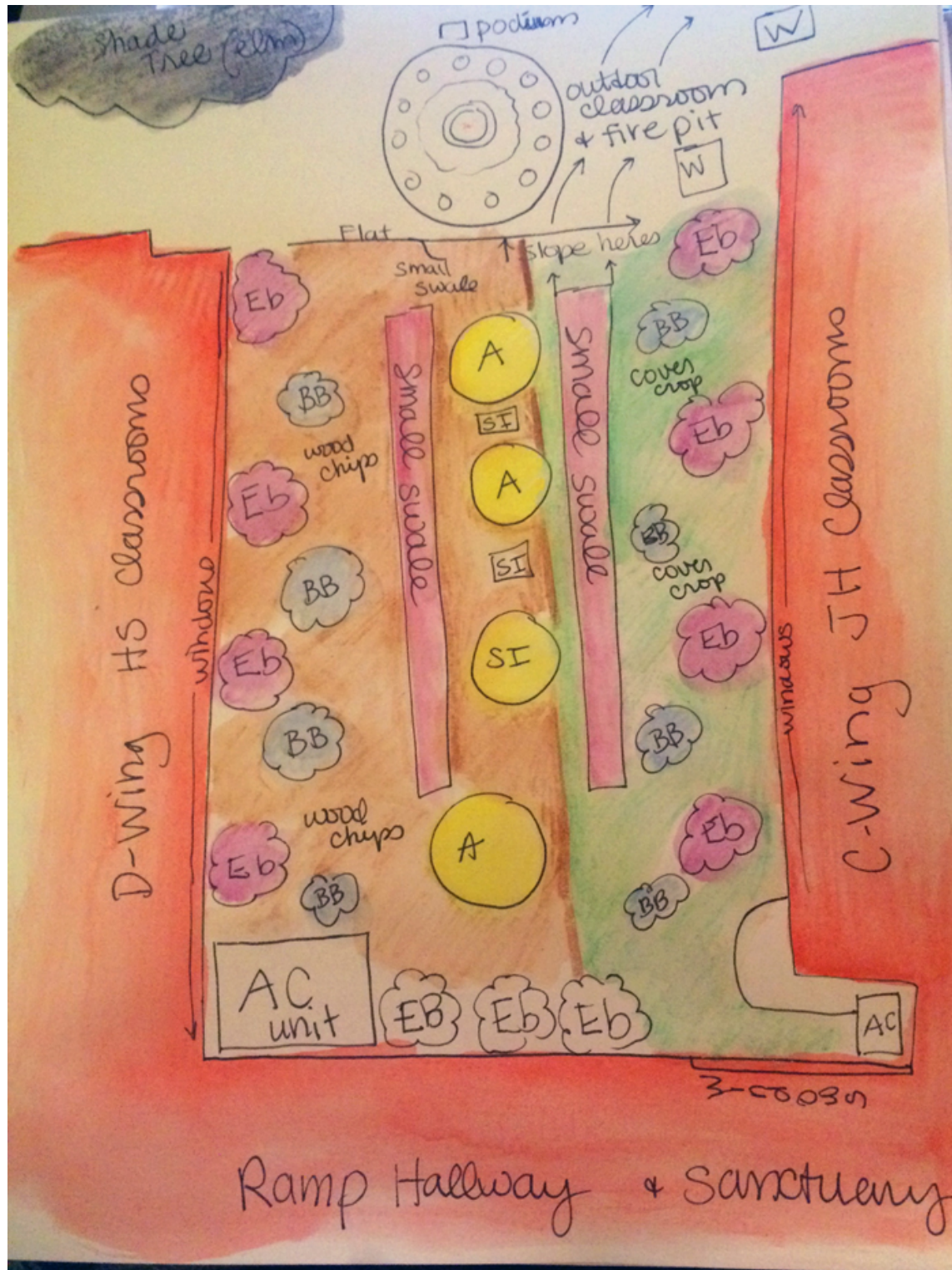
PHASE 2 | ELEMENTARY FOOD FOREST DEVELOPMENT (2015-17)

Over the course of this two year period, we will finish the elementary food forest and continue with soil building, composting, etc. At present (May 2015), each tree / shrub has a circle of stones around them to keep the mowing company off our wood chips and cover-crops. In summer 2015, we will turn the circles out straight to create a linear path, which will be much easier to mow and grow around. This will also enable us to keep a commercial looking edge to the perimeter of the food forest lane. We have created a zig-zag pattern around each opening window to allow for emergency exiting / access and easier pruning of the shrubs. Since serviceberries can get larger, we will keep our pruned to a bush shape in order to block the sun in the summer and let in light during the winter. Currently, this area has full - partial sun exposure.

PHASE 2 | ELEMENTARY FOOD FOREST



PHASE 2 | C&D WING FOOD FOREST



Phase 2 | Part 3: Nitrogen Fixing Trees

Starting in late 2014, we started many seedlings in a greenhouse off campus in order to have more mature seedlings plant in fall 2015. Most of these will be used for either pollinating or coppicing purposes. The species we will be planting in fall 2015 include:

- False Blue Indigo, *Baptisia australis*
 - Lead plant, *amorpha canescens*
 - Shurb Indigo Bush, *Amorpha fruticosa*
 - Thornless Honey Locust, *Gleditsia tricanthos f. inermis*
 - Black Locust, *Robinia pseudoacacia*
-

FUTURE PHASES

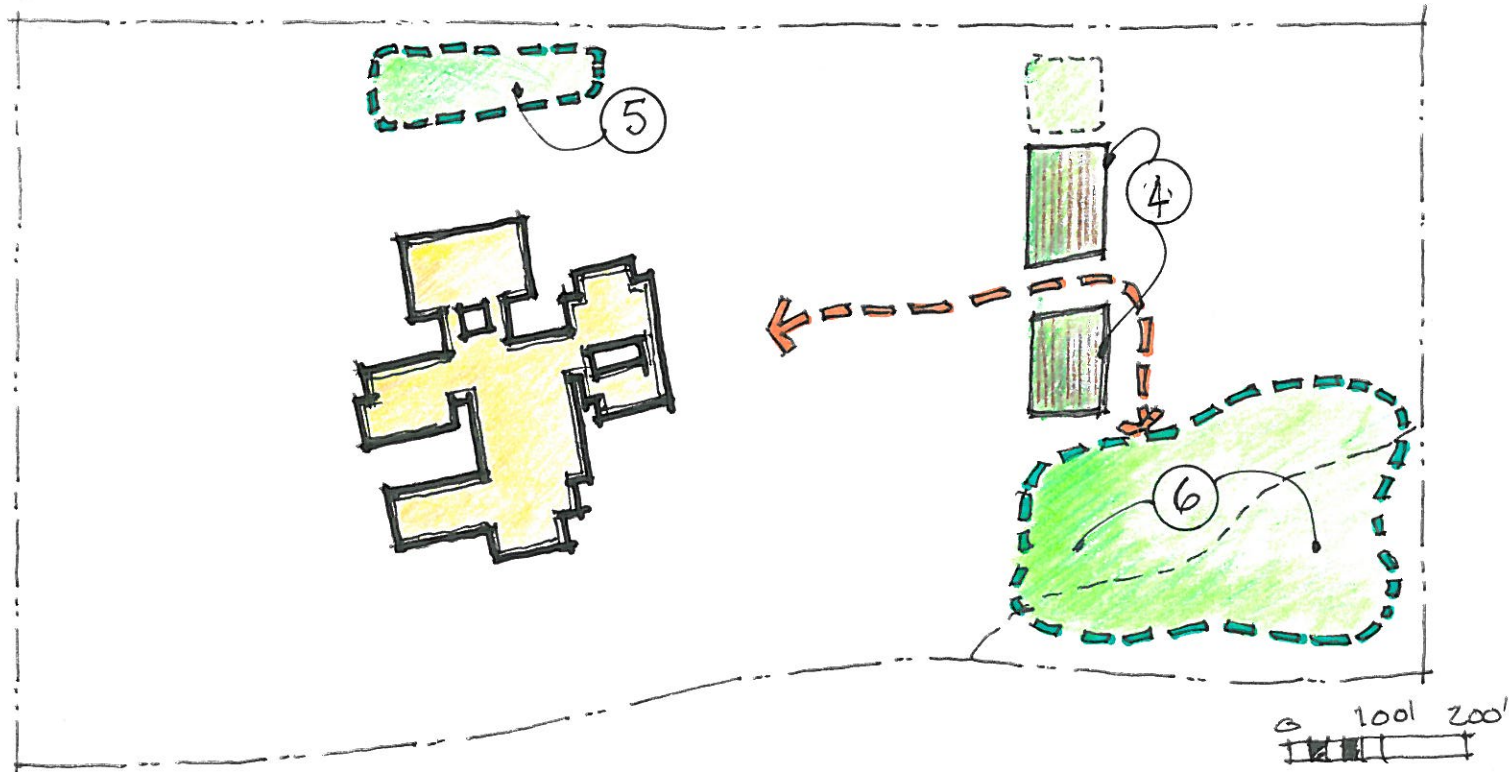
It is the goal over the next five years to begin heavy remodeling phases. Though the permaculture phase 2 will end in 2017, the property will begin to be transformed as far as the buildings and structures. At that point in time, we will continue to use the gardening and permaculture students at the school to maintain and harvest from the existing systems. We will continue to fine tune and hone the curriculum, and we will wrap up any loose ends that we have left building each of the first two phases.

In the meantime, I will be meeting regularly with the school administration and will likely be assisting in the development phases as we continue to build.

In conclusion, the following images are the hard-scape and building plans for the next decade. These were drawn up before we began the permaculture practices, so a revised version of this will be on the docket in the next two years to include the previously mentioned phases.

Phase 1

1. Continue Vision Casting and Fund Raising - Pay off loan + funds for master plan implementation.
2. Debt Service - \$300,000 + \$100,000 annual escrow account.
3. Develop required documentation to secure approval for Master Plan.
4. Develop the Agriculture Zone: Community Gardens / missions training areas & future Green House.
5. Expand Existing Orchard.
6. Develop Environmental Science Program along drainage swale.

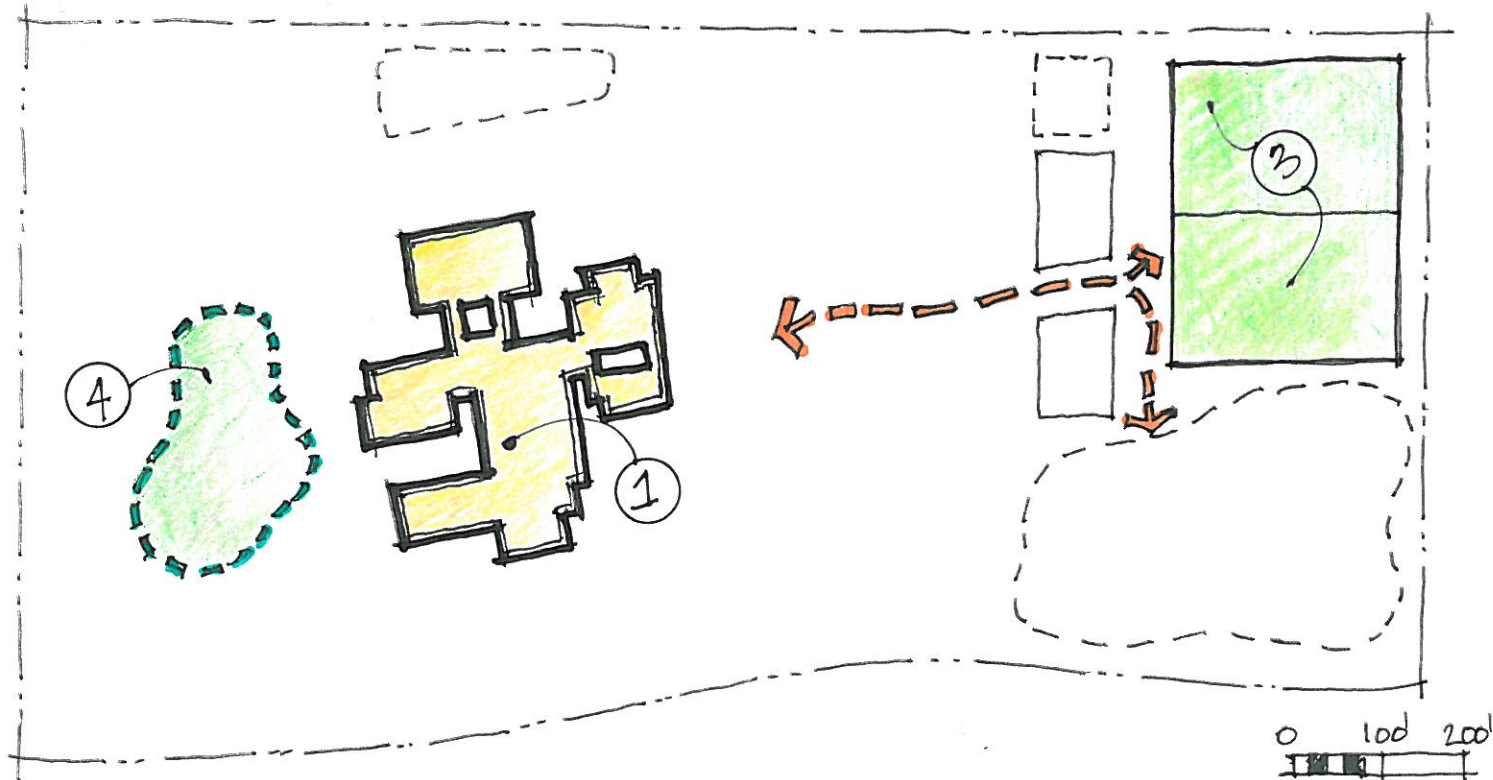


THE DANIEL ACADEMY

10 YEAR CONCEPTUAL MASTERPLAN

Phase 2

1. Renovation of Existing Building - Roof etc.
2. Continue Vision Casting and Fund Raising. Pay down loan further + \$100,000 Escrow fund.
3. Develop Fields - Soccer field size for general Physical Educational purposes / Jogging trails etc.
4. Develop Outdoor play areas on existing grassy knoll.

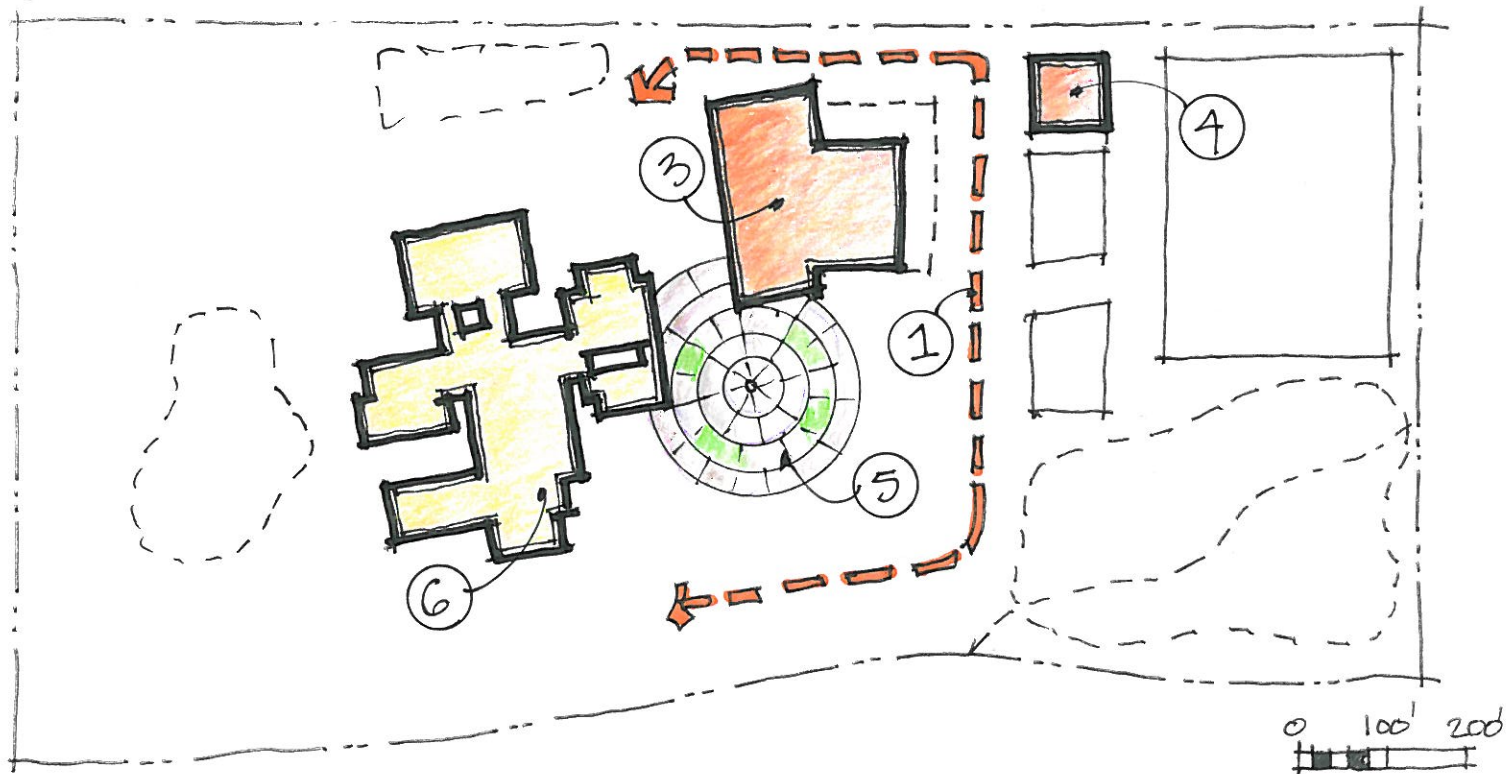


THE DANIEL ACADEMY

10 YEAR CONCEPTUAL MASTERPLAN

Phase 3

1. Develop new road and parking areas.
2. Continue Vision Casting and Fund Raising. Pay down loan + \$100,000 Escrow fund.
3. Build First Phase of Multi-Purpose Building (Gym, Stage, Music Classrooms). Arts & Entertainment.
4. Build out Green House.
5. Create new TDA Central Courtyard.
6. Reallocate existing classrooms due to High School Students moving to new building.

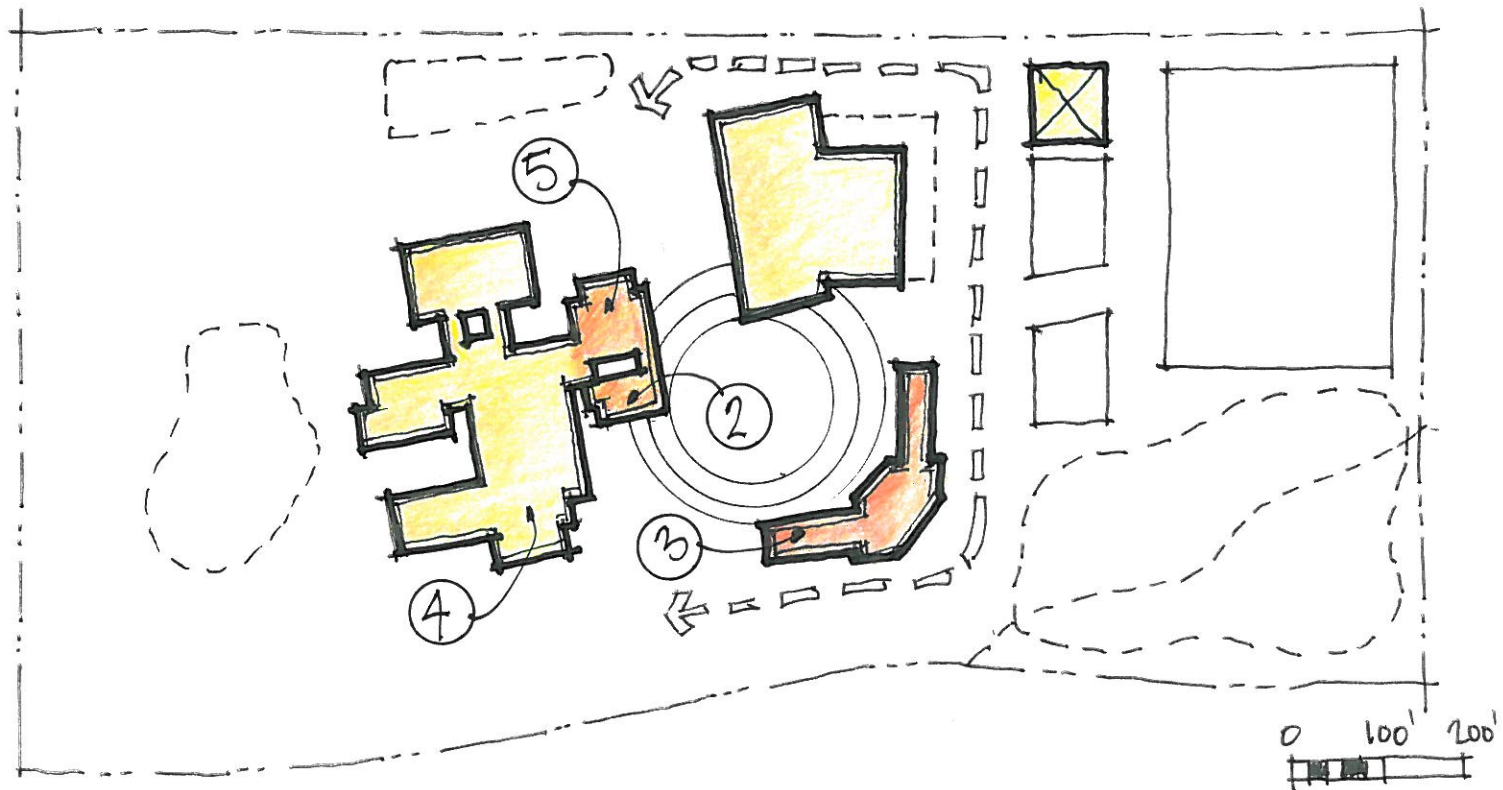


THE DANIEL ACADEMY

10 YEAR CONCEPTUAL MASTERPLAN

Phase 4

1. Continue Vision Casting and Fund Raising.
2. Relocate Admin to new central location - upper wing of 'Z' Wing.
3. Construct New Classroom building - Media Center & Classrooms.
4. Reallocate balance of classroom in original building.
5. Develop Central Library lower portion of existing 'Z' wing.

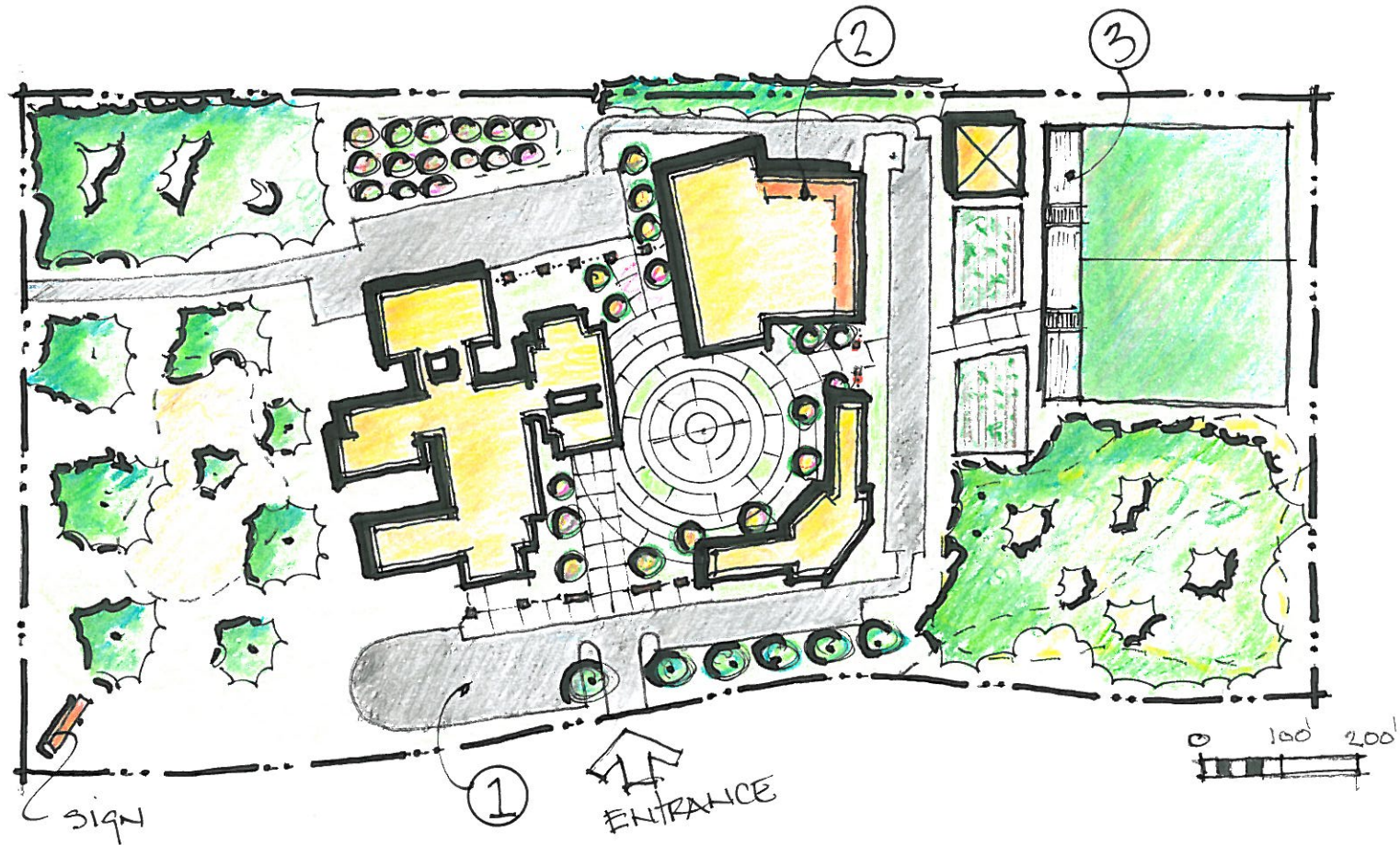


THE DANIEL ACADEMY

10 YEAR CONCEPTUAL MASTERPLAN

Phase 5

1. Complete Parking restructuring and Campus Security Fencing.
2. Complete 2nd Phase of Multi-Purpose Building
3. Develop stadium type seating at the field.
4. Establish Endowment fund for future develop.



THE DANIEL ACADEMY

10 YEAR CONCEPTUAL MASTERPLAN